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Thomas Jefferson National Accelerator Facility

Project Control System Manual

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Thomas Jefferson National Accelerator Facility

Project Control System Manual

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Project Control System Manual

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100 Introduction

100 Introduction

- A. The Project Control System Manual describes the process and procedures for implementing an Earned Value Management System on projects conducted at the Jefferson Laboratory. This manual supports the Jefferson Lab mission by facilitating the achievement of project success regardless of project size or complexity. Earned Value Management is an acknowledged management process for the organization, planning, performance measurement, and controlling of projects. A project's technical scope of work is integrated logically with its schedule and budget to form an approved project baseline. Accomplished work and accrued costs during project execution provide essential earned value information to measure performance for comparison to this baseline. Project management gains valuable insight into the health of the project by examining the earned value indicators.
- B. Earned Value Management is a systematic framework to communicate project progress and performance across all levels of the project management team and to the project customer. The Earned Value Management System is more than just a method to report the status of a project. It is a vital management tool that allows project leadership to "manage by exception" and focus on the critical issues of a project. The earned value indicators provide quantifiable project data for identifying, analyzing, understanding, and resolving problems. The project management team can be proactive in engaging potential problems before they have a major impact to the project and thus prevent surprises that cost the project time and money.
- C. The Project Control System Manual is organized along the Earned Value Management Systems guidelines established in the American National Standards Institute (ANSI)/Electronic Industries Alliance (EIA) Standard-748-A-1998. This project management standard defines 32 "best practice" criteria for implementing the Earned Value Management process. By implementing the Earned Value Management process and procedures documented in this manual, the project management team can:
- establish a standard approach to organizing the various elements of a project.
 - facilitate the formation of a comprehensive time-phased budget by thorough schedule planning and cost estimating.
 - control project activity flow by defining how work is formally authorized.
 - capture actual costs on the project via the Lab accounting system.
 - determine specific work progress on the project at a detail level.
 - perform variance analysis on the resultant earned value data to measure performance against the approved project baseline.

- establish a consistent process for controlling changes to the project baseline.
- D. Successful implementation of the Earned Value Management System at Jefferson Lab will result in numerous benefits to the organization and to the project management team.
- Detailed planning at the beginning of a project often addresses problems that may surface later in the effort, preventing schedule slips, increased costs, and/or technical rework. Project leaders can easily identify problem areas and pin down the specific sources of the problems with detailed planning.
 - Better visibility into the performance of the project is gained due to the integrated method of extensive planning, earned value analysis, and baseline control.
 - Project accountability is fostered and overall project quality is enhanced by the identification of a responsible person/organization at each work level.
 - Project risk reduction is enhanced by the availability of earned value metrics allowing project management to mitigate impacts by making early adjustments to the project. Accurate estimates of schedule completion and projected final costs can be produced.
 - A single, integrated management control system provides reliable data for analysis. Integrity of the project performance data will be enhanced and informed decisions can be made based on objective data collected by the project.
 - The level of information overload experienced can be reduced by employing the principle of “management by exception.”
- E. The guidelines and procedures described in the Project Control System Manual are not directive in nature, but represent the standard approach to controlling projects undertaken at the Jefferson Lab. Certain customers (e.g., Department of Energy) will require the implementation of an Earned Value Management System based on the dollar threshold of the project’s anticipated cost. Other projects are highly encouraged to avail themselves of the tools and processes highlighted in this manual to establish a proactive project management environment. Depending on the size, complexity and risk of the project, the processes can be tailored to best facilitate the successful achievement of the project goals. Projects with low complexity and risk factors may not require the same level of insight, management and control associated with a more complex project requiring significant planning and resources. Implementation of the processes described in the Project Control System Manual should be addressed specifically in all Project Execution

Plans. All plans should identify those Earned Value Management elements deemed not applicable and provide a rationale for their exclusion.

101 Roles and Responsibilities

The following roles are the key management elements responsible for implementing the processes delineated in the Project Control System Manual.

- **Project Customer**
The ultimate stakeholder with a vested interest in the positive outcome of the project. Responsible for project funding and the establishment of project requirements.
- **Project Director/Manager**
The senior leader of the project management team. (Title may be Project Director or Project Manager depending on project size and project customer, or a project may have both positions.) Responsible for all aspects of project control from planning and budgeting to analysis and reporting.
- **Associate Project Manager**
The next level down from the Project Director/Manager. There may be multiple Associate Project Managers with responsibility for managing top-level system elements of the project.
- **Cost Account Manager**
The key person responsible at the detail level of project planning and execution. Manages one or more Cost Accounts representing the lowest level where project performance is measured.
- **Director, Office of Project Management (OPM)**
The Director and the OPM staff are responsible for the Project Control System Manual and the implementation of the Earned Value Management System process at Jefferson Lab. Under the Director are the Project Services Manager and the OPM Financial Manager who provide project and financial support to the project management team in applying the processes documented in the Project Control System Manual.
- **Chief Financial Office**
Responsible for the financial system where accounting for project costs occurs.

102 References

The following documents were used as guidance in the development of the Project Control System Manual.

- DOE Manual 413.3-1, *Project Management for the Acquisition of Capital Assets* (3-28-03)
- DOE *Earned Value Management Application Guide*, Version 1.6 (January 1, 2005)
- DOE *Work Breakdown Structure* Project Management Practices (Rev E, June 2003)
- DOE *Scheduling and Cost Estimating* Project Management Practices (Rev E, June 2003)
- DOE *Performance Baseline Development and Validation* Project Management Practices (Rev E, June 2003)
- American National Standards Institute (ANSI)/Electronic Industries Alliance (EIA) Standard - 748-A-1998, *Earned Value Management Systems (EVMS)* approved May 19, 1998, reaffirmed August 28, 2002
- Project Management Institute *Practice Standard of Earned Value Management* (2005)
- National Defense Industrial Association *ANSI/EIA-748-A Standard for Earned Value Management Systems Intent Guide* (January 2005 Edition)
- National Defense Industrial Association *Surveillance Guide* (October 2004 Edition)

103 Revision of the Project Control System Manual

The Project Control System Manual is maintained by the Jefferson Lab Office of Project Management. Questions, comments, and suggested revisions concerning this manual can be addressed to the OPM staff. The Office of Project Management will review the Project Control System Manual annually to assess the need for revisions to this document. Proposed changes to the manual will be evaluated for impacts to the Earned Value Management process that could potentially affect system certification. All revisions will be approved by the Director, Office of Project Management. Approved revisions to the Project Control System Manual will be annotated in the Document Revision Log.

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200 Organization

200 Organization

This section of the Project Control System Manual outlines the organizational elements of the Project Control System process. Data for Jefferson Lab projects are organized in three main databases and managed by an integrated software suite. Project work to be performed is organized by developing a Work Breakdown Structure (WBS). A functional organization, composed of Jefferson Lab personnel and possibly outside contractors, is formed to assign project work activities to groups or individuals who will be responsible for performing the work. Using the WBS structure, Cost Accounts are established to facilitate the preparation of accurate project cost and schedule estimates and the collection and development of data for project control.

201 Project Control System Integration

There are three Jefferson Lab system components that are integrated to form the prime management tool for the Project Control System. All of the projects at Jefferson Lab are organized under the Jefferson Lab Enterprise Project Structure. This enterprise structure is a master project database containing information on projects under development and those in the execution phase. The Schedule Management System is the core software for this master project database. It is used extensively during project schedule development, planning and monitoring. The second component of the Project Control System is the Lab's financial system. This accounting database of fiscal transactions provides actual project costs to the third component, the Cost Management System. This software system integrates the project's resource-loaded schedule with the accounting system data to generate and analyze a project's cost and schedule performance. By linking the various project databases, the Schedule and Cost Management Systems can provide the project management team with the requisite earned value data to determine the current project status and to forecast cost and schedule estimates at project completion.

202 Work Breakdown Structure

- A. The Work Breakdown Structure (WBS) (Exhibit 1) with its associated WBS dictionary is the key element for organizing a project. Its purpose is to divide the project into manageable segments of work to facilitate planning and control of technical scope, schedule and cost. A well designed WBS will ensure all required work is incorporated in the project and that no unnecessary work is included.
- B. The WBS is a structural organization of related elements that defines the total work scope required to accomplish project objectives. It takes the form of a

multi-level hierarchical framework depicting the overall project deliverable down to the smallest system component. Each descending level represents an increasingly detailed definition of a project component. The project WBS describes the technical content of the project, and is the basis for project management, cost estimating and budgeting, schedule management, cost and schedule control, and reporting of cost and schedule performance. A high-level WBS is developed early in the conceptual stage of the project with more detail added as the project definition is refined. The level of detail in a WBS is a function of the size of the project and a balance between complexity, risk, and the Project Director's need for control.

- C. Early and accurate WBS planning is essential to getting a project off to a good start. If project requirements change however, the WBS will evolve with the project. Revisions to the WBS may be required due to the expansion or contraction of project scope and/or the movement of a project through its various stages (i.e., design, engineering, development, production/installation, and operation). Modifications to the WBS are implemented by means of the Change Control process.

202.1 WBS Development

- A. The project WBS is a product-oriented decomposition of the project (Exhibit 2) and is organized in multiple levels of increasing detail. The first three levels of the WBS are defined to facilitate overall assignment of project management responsibilities and the logical aggregation of cost data. WBS Level 1 is the entire project and represents the total responsibility assigned to the Project Director. For WBS Level 2, the overall project is divided into product-oriented segments and a process-oriented system for project management. Each Level 2/Level 3 (as appropriate) segment is managed by an Associate Project Manager. WBS Level 3 elements are definable components of Level 2 segments that accomplish a specific purpose.
- B. Additional levels of the WBS (Levels 4, 5, 6, etc.) can be included as needed to extend the WBS to a level of detail necessary to reflect the complexity of the work scope. Not all legs of the WBS must be composed of the same number of levels. The Cost Account is the lowest level of the WBS and is the level at which cost estimates are prepared, time-phased budgets are prepared, actual costs are accumulated, and earned value is assessed.
- C. Each Cost Account and higher WBS element is assigned a unique WBS number (see Exhibit 1). The WBS number is used to accumulate and report performance measurement data (cost estimates, budgets, earned value, and actual costs) and to summarize at higher WBS levels. Performance measurement data are derived directly from entry-level data collected or prepared at the Cost Account level.

202.2 WBS Dictionary

A complete Work Breakdown Structure requires an associated dictionary (Exhibit 3) to provide descriptive information for each WBS element. The WBS dictionary thoroughly describes the scope of each work element (including deliverables) identified in the WBS. It also outlines the resources and processes required to produce each element. As with the WBS itself, the WBS dictionary should be revised to reflect project changes and should be kept up to date during the life of the project.

203 Project Organization

A complementary arrangement to the WBS is the organizational structure (Exhibit 4) that will provide the resources required to perform the project work activities. Project leadership can design a hierarchical framework where unique work responsibilities can be established for each part of a project. The framework establishes the formal authority relationships that exist among the various project team elements. This can take the form of a standard organization chart with the structure progressively detailed downward to the lowest levels of management.

204 WBS and Organization Integration

Integrating Jefferson Lab organizations with the WBS ensures that all project work is accounted for and that each element of work is assigned to the level of responsibility necessary for planning, tracking progress, accumulating costs, and reporting. A Cost Account is comprised of a WBS work element and an individual with the authority to accomplish this work, the Cost Account Manager. Project cost, schedule and work scope requirements are integrated, planned and managed at the Cost Account level. Data collection takes place at the Cost Account level and can be summarized for higher levels of visibility into project plans and performance. All pertinent information concerning the Cost Account is captured in a Cost Account Plan with the Cost Account Manager responsible for its development and execution.

205 Responsibility Assignment Tree

Available from the Jefferson Lab Financial Management System, the Responsibility Assignment Tree ensures that each work element has an appointed authority for its accomplishment.

206 Exhibits

1. WBS Example
2. WBS Diagram Example
3. WBS Dictionary Example
4. Project Organization Example

Exhibit 1. WBS Example

- | WBS Level | | |
|------------------|-------------------------------|--|
| <u>1</u> | <u>2</u> | <u>3</u> |
| 1. | 12 GeV Upgrade Project | |
| | 1.0. | CDR |
| | 1.1. | R&D |
| | 1.2. | PED |
| | 1.3. | Accelerator Systems |
| | | 1.3.1. Cryomodules |
| | | 1.3.2. Power Systems |
| | | 1.3.3. Cryogenics |
| | | 1.3.4. Beam Transport |
| | | 1.3.5. Extraction |
| | | 1.3.6. I&C / Safety Systems |
| | 1.4. | Upgrade Hall A, B & C |
| | | 1.4.1. Hall A |
| | | 1.4.2. Hall B |
| | | 1.4.3. Hall C |
| | 1.5. | Hall D |
| | | 1.5.1. Solenoid |
| | | 1.5.2. Detectors |
| | | 1.5.3. Computing |
| | | 1.5.4. Electronics |
| | | 1.5.5. Beamline |
| | | 1.5.6. Infrastructure |
| | 1.6. | Civil |
| | | 1.6.1. Accelerator |
| | | 1.6.2. CHL |
| | | 1.6.3. Hall D |
| | 1.7. | Project Management |
| | 1.8. | Pre-Ops |
| | 1.9. | Advanced Conceptual Design |

Exhibit 2. WBS Diagram Example

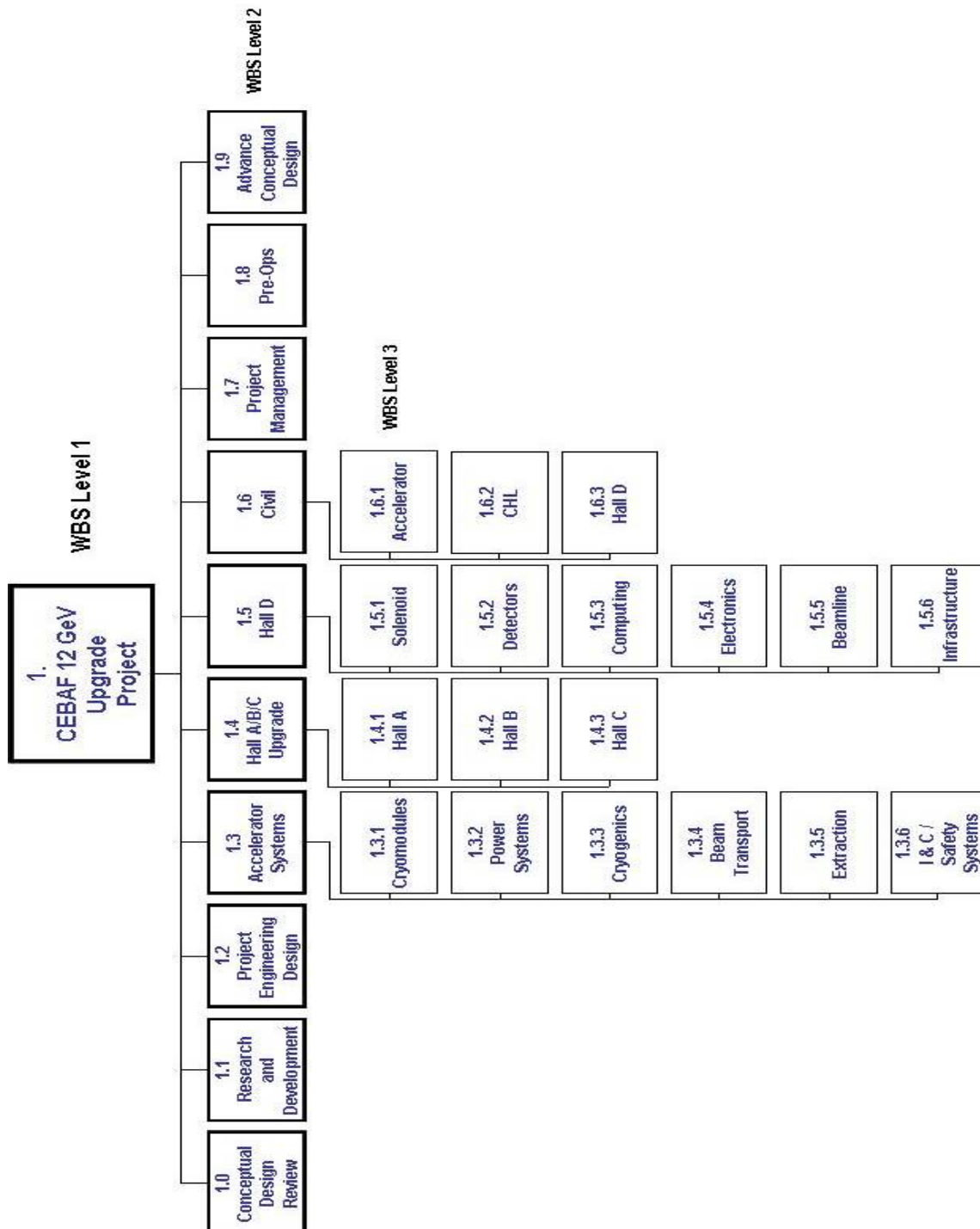
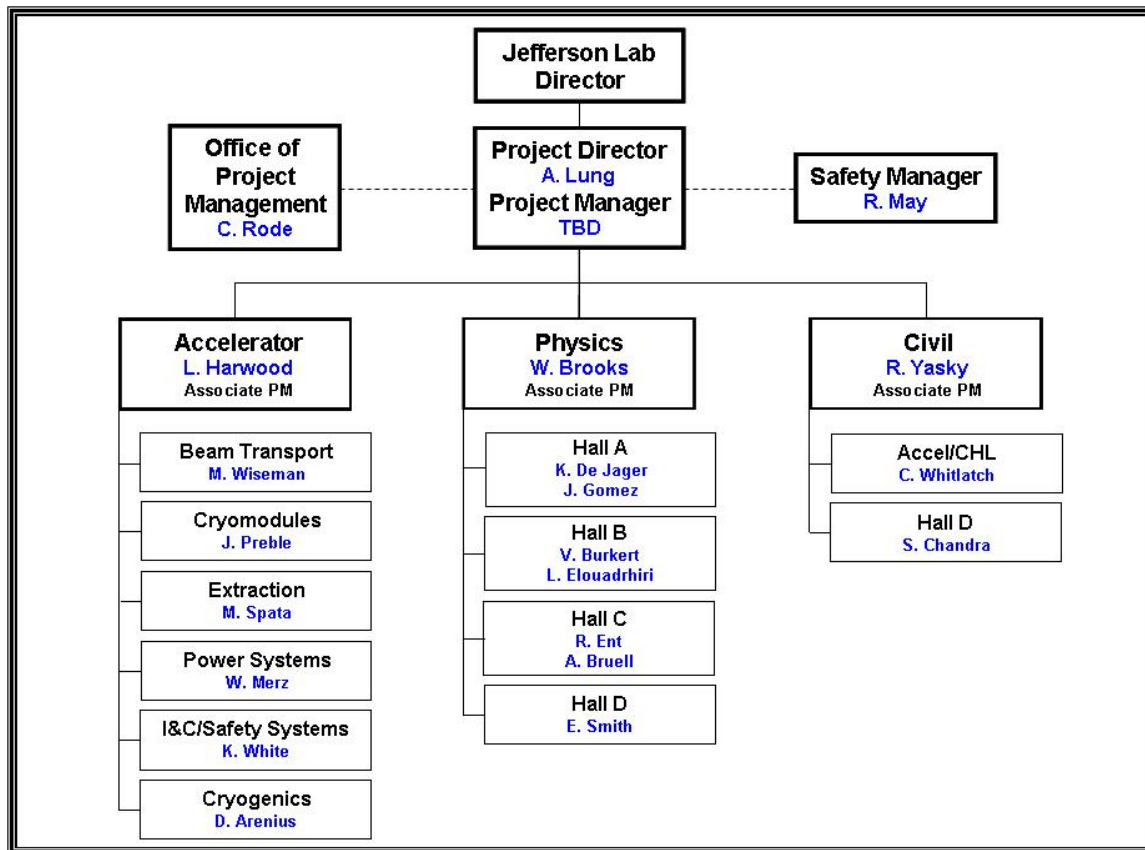


Exhibit 3. WBS Dictionary Example

WBS	Title	Description
1.2.1.3.1	Accelerator	
1.2.1.3.1.1	CHL Building Layout and Utilities Req	Existing and New CHL building detail requirements, equipment layout, utility schedules
1.2.1.3.1.2	CHL System P&ID Development	Process and Instrumentation Diagram Development for the Cryogenic Equipment Subsystems
1.2.1.3.1.3	CHL Warm Helium Compressors	Equipment specification and design criteria for new CHL 1st and 2nd stage warm helium compressors
1.2.1.3.1.4	CHL Cold Boxes	Equipment Specification and Design Criteria for the new CHL 4K cold boxes
1.2.1.3.1.5	CHL Oil Removal System	Equipment Fabrication Design and material specification for the Final Oil Removal Equipment Assembly
1.2.1.3.1.6	CHL Gas Management Rack	Engineering Design and Fabrication Documentation generation for the gas management valve rack assembly
1.2.1.3.1.7	CHL System Instrumentation and Controls	Engineering Design and material specification for the fabrication assembly of the new CHL instrumentation and control racks, programming, and system controls
1.2.1.3.1.8	CHL Instrument Air System	Additional Instrument Air System to support new CHL control valve operations
1.2.1.3.1.9	Motor Control Centers	480V and 4160V Motor Control Center Lineup Specification for purchase
1.2.1.3.1.10	CHL Installation Design	Electrical, Mechanical, and Controls Installation Design Package generation for field installation construction phase
1.2.1.3.1.11	CHL Commissioning	Startup and Performance Testing of Installed new CHL refrigerator system
1.2.1.3.1.12	Linac Transfer Line	Completion of transfer line and bayonet assemblies, u-tubes for linac spare cryomodule slots

Exhibit 4. Project Organization Example



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300

Scheduling and Budgeting

300 Scheduling and Budgeting

This chapter of the Project Control System Manual describes the planning processes required to develop a practical project plan that can be implemented by the designated project team. The major goal of this planning effort is an integrated project schedule and budget. Schedule planning results in a schedule that describes the sequence of technical work and the task interdependencies necessary for a successful project outcome. Cost planning begins with the development of a cost estimate for all authorized work that will be resource loaded into the schedule and eventually lead to the establishment of the project budget. Proper project planning ensures the amount of work to be accomplished, the time allotted to accomplish the project activities, and the resources required to complete the work scope are evenly balanced. Once the schedule and cost planning are concluded, the resultant plans can be merged to form a time-phased project budget that is seamlessly integrated with the resource loaded network schedule. This initial project budget is validated and approved as the Integrated Project Baseline and is endorsed by the project team as the Performance Measurement Baseline, a foundational element of earned value management. Meaningful earned value performance metrics enable better management insight and decision making to help keep the project on track.

301 Schedule Planning

The objectives of schedule planning are 1) to generate a reasonable schedule of work that leads to project completion; and 2) to establish a Schedule Baseline that, when integrated with a Cost Baseline using resource loading techniques, will result in an Integrated Project Baseline for the project. The core of the schedule planning process is the Schedule Management System and its associated schedule software. This system provides the requisite program management tools to plan and sequence project milestones and activities, to assign resources to the activities, to monitor progress of activities toward project objectives, to forecast future schedule performance, and to provide the basis for earned value and performance calculations.

301.1 Schedule Management System

- A. The Enterprise Suite consists of schedule and cost software packages that are part of the overall Jefferson Lab Enterprise Project Structure. The central component to the Schedule Management System is the Enterprise Suite schedule software. It is a powerful and flexible scheduling tool that is used to perform time analyses of logic network, maintain baseline and status information, prepare standard reports at regular intervals and special custom reports as needed, and provide the basis for earned value and performance calculations by seamless connectivity to the Cost Management System.

1. Time analysis is the process of calculating the earliest start and finish dates and the latest start and finish dates of each activity, based on the duration of the activities, the logical relationships between them and the desired completion date of the project. In addition to these calculations, the scheduling software also determines free float (the amount of time an activity can be delayed without delaying subsequent activities), total float (the amount of time an activity can be delayed without delaying project completion as a whole), and the critical path (the longest path from the logic network start to finish and the sequence of activities with the least total float). Any delay in a critical path activity will extend the total project schedule.
 2. For each activity in the project schedule, the scheduling software maintains the early start, early finish, late start, late finish, and, after they occur, the actual start and the actual finish dates in the Working Detail Schedule. Actual starts and finishes affect the remainder of the logic network by changing the early and late start and finishes of subsequent activities in the Working Detail Schedule. Therefore, a time analysis is conducted in the Working Detail Schedule after each status update. The scheduling software also maintains a separate file of baseline start dates, baseline finish dates and other baseline data in the Schedule Baseline. These baseline dates are not affected by actual starts and finishes. Instead they are retained for comparisons between planned and actual dates.
 3. The scheduling software produces reports in three different formats: Gantt chart, logic diagram or in tabular format, and has flexible report generation routines. The use of relational databases and the manner in which the information is coded permit the creation of special reports, as needed. These are useful to assess the effects of various schedule alternatives, to extract portions of the project, or to select categories of milestones/activities for review.
- B. The scheduling group within the Office of Project Management is responsible for administration of the Schedule Management System. This includes schedule preparation, horizontal and vertical integration of elements of the scheduling system, maintenance of schedule baselines, status reporting, and programming enhancements to the scheduling system. Information is obtained from all levels of project management in carrying out these responsibilities.

301.2 Schedule Development

A. Baseline Milestones (Exhibit 5)

The schedule planning process begins with the determination of the Baseline Milestones. These level 1 and 2 milestones with their planned dates form a master schedule for the project. This top-level schedule contains significant events and critical decision points that could affect the technical, schedule, and/or cost performance of the project. The Baseline Milestones and their associated definitions are mutually developed by the Jefferson Lab Project Director/Manager and the Project Customer. They are re-examined and rescheduled, if necessary, during customer reviews. Based on the decisions by the Project Customer and the Project Director/Manager, OPM develops the Baseline Milestones Schedule of planned and proposed dates for each milestone.

B. Intermediate Milestones (Exhibit 6)

Once the Baseline Milestones Schedule has been created, the next level of detail can be incorporated by designating the project's Intermediate Milestones. The Intermediate Milestones are level 3 and 4 elements and provide a secondary level of scheduling. These Intermediate Milestones are selected by the Project Director/Manager and the Associate Project Managers.

C. Detail Milestones

To complete the milestone schedule development, the Cost Account Managers generate level 5 and 6 Detail Milestones.

D. Detail Schedule (Exhibit 7)

The Baseline Milestones Schedule, populated with the Intermediate and Detail Milestones, serves as the framework to add the work activities to the project schedule. The detail schedule is developed from the Cost Account Plans initiated by the Cost Account Managers during the cost planning process (see section 303 Integrated Project Baseline Development). OPM incorporates the schedule and resource information contained in the Cost Account Plans and builds a comprehensive schedule logic sequence that includes the sequence, start and finish dates and duration of every activity required to complete the project. The resulting detail schedule contains all project milestones, the work activities, and the logical ties between the schedule elements. This then becomes the Schedule Baseline of the project.

E. Working Detail Schedule

While the Schedule Baseline constitutes the performance standard against which actual progress is compared, the Working Detail Schedule is a working tool for evaluating schedule plans and projecting future progress. In order to preserve its value as a baseline, changes to the Schedule Baseline are carefully controlled and documented. On the other hand, the Working Detail Schedule is continuously revised as actual activity status and completion dates are entered and their effects on future scheduled activities are calculated. Consequently, this results in changes to early and late, start and finish dates that may no longer be consistent with the Schedule Baseline. These revised dates are used to forecast when detail, intermediate and baseline milestones will actually be accomplished, and to guide management corrective action.

302 Cost Planning

- A. Cost planning is the other major planning activity required to develop an Integrated Project Baseline. The purpose of cost planning is to identify the resources needed to accomplish the scope of work and estimate the associated costs. Cost represents the dollar value required to accomplish the technical work scope within schedule and programmatic constraints. A preliminary cost estimate can be started after an initial Work Breakdown Structure is developed. Cost estimate integration with the WBS occurs when the work scope in each WBS element, each Cost Account, and each scheduled work package/activity has a definitive cost/resource estimate associated with it. Once the cost estimate is approved at all management levels, it becomes the Cost Baseline, i.e., the project's budget.
- B. Elements of the cost estimate include both direct charges and indirect charges. Direct charges are costs applicable to, and identified specifically with, the project work scope and examples of these types of costs include labor, travel, material, subcontractor costs, etc. Indirect charges are costs that cannot be consistently or economically identified against a specific Jefferson Lab project and are spread over the total laboratory project portfolio. Cost estimating is a continuous process initiated during the conceptual phase and refined throughout project execution.

302.1 Cost Management System

The Cost Management System is an integral element of the Enterprise Suite software package used at Jefferson Lab. Initial budget data enters the Cost Management System via its link to the Schedule Management System. Direct and indirect costs are imported from the Lab's financial system. The Cost

Management System, together with the Schedule Management System, form an integrated cost/schedule database that enables the project management team to understand a project's costs at the transaction level.

302.2 Cost Estimating

A disciplined and systematic cost estimating process will promote integrity in a new project. As project performance will be measured against the project baselines, it is important that an accurate cost estimate be determined early in the project. Project management may use a top down approach, a bottoms-up approach, or a combination methodology when generating a cost estimate.

302.3 Funding Guidance

In formulating an initial cost estimate for the project, the Project Customer usually provides funding guidance to the Project Director/Manager that delineates the proposed total budget for the project and may include a fiscal year breakout. The Project Customer may elect to hold in reserve some budget from the total project cost as Contingency funds. The Project Director/Manager uses the funding guidance to establish a project funding profile across the WBS Level 2. Target budgets are developed and distributed to the Associate Project Managers and Cost Account Managers. This represents the Project Director/Manager's guidance to Associate Project Managers and Cost Account Managers when they develop the details of the cost estimate for their portion of the project. As with the Project Customer, the Project Director/Manager can withhold Management Reserve funds at the project level to adjust for any uncertainty that may arise during the execution of the project plan.

302.4 Cost Estimate Development

- A. Once the Project Director/Manager has established an initial funding profile for the project, the Office of Project Management will prepare a Cost Sheet form (Exhibit 8) for each Cost Account. The Cost Sheet documents the most up-to-date plan for fiscal year and total dollar obligations that are anticipated from specific assignments of labor, expense, and procurement resources to each Cost Account. Using the Cost Sheet, the Cost Account Managers form an initial cost estimate for their Cost Accounts showing the dollars expected to be committed by fiscal year.
- B. After the initial Cost Sheets have been developed, an extensive project management evaluation and validation of the proposed project cost is accomplished. Multi-level dialogue among the Project Director/Manager, the Office of Project Management, Associate Project Managers, and the Cost Account Managers will be required to reach consensus on a final cost profile for the project. Summary Cost Sheets are prepared by OPM for each higher-

level element in the WBS and are used by the Associate Project Managers and the Project Director/Manager to identify areas where actions must be taken to restructure work scope or reassess resource requirements to meet anticipated fiscal year and total project funding constraints. With an agreement on the final cost profile, the Cost Account Managers will revise the Cost Sheets and OPM will update the Summary Cost Sheets. Overhead rates and escalation factors are applied to dollar figures in the Cost Sheet from information supplied by the Chief Financial Office.

- C. Cost Sheets and Summary Cost Sheets are assembled in a project's Cost Book. This document represents the total estimated cost for the work scope identified as necessary for successful accomplishment of the project and is used to establish the Cost Baseline.

303 Integrated Project Baseline Development

- A. While the Cost Sheet shows the dollars expected to be committed by fiscal year, it does not include the specific months during which resources will be applied or the specific tasks that will be accomplished. These details are contained in the Cost Account Plan. Using the Cost Account Plan sheet (Exhibit 9), the Cost Account Manager develops work activities to divide the Cost Account into discrete manageable and measurable segments of work for the purpose of developing plans and determining progress. Each activity is sequenced in a manner that provides logical support for the project schedule. Work activities are at or below the reporting requirements such that earned value performance measurement takes place at the Cost Account level.
- B. With the work activities identified in the Cost Account Plan, the Cost Account Manager determines the types of resources (labor, expenses, procurements) required and the quantity (hours, dollars) needed for each resource element. Labor resources are estimated according to various cost element categories, such as Plant Engineer, Mechanical Engineer, and Scientist, etc. Expense estimates are prepared for such items as supplies and materials, travel, and consulting. Labor and expense estimates are assigned to the month/fiscal year during which they will be used or expended. Estimates for procurements are also made and are assigned to the month/fiscal year in which payment is anticipated to occur. Dollar amounts for all cost estimates are entered in current year direct dollars. Once the resources have been identified and their costs estimated, a schedule of the work activities is developed with start dates and activity durations annotated in the Cost Account Plan. Data from the Cost Account Plans is used to develop the Detail Schedule as discussed in section 301.2 Schedule Development.

- C. One essential product of the Cost Account Plan is the identification of the types and levels of labor resources that must be provided by each functional organization supplying labor to the project. Summary reports showing labor requirements in support of work scope as documented in the Cost Account Plans are prepared by Project Services and used by senior project management to assure the availability of such personnel when needed.
- D. At this stage in the planning process, three project baselines have been established: the Technical Baseline, the Schedule Baseline, and the Cost Baseline. The Technical Baseline, organized around a WBS framework, describes the desired configuration, performance, and characteristics of the project and establishes the project's mission, technical objectives, and functional requirements. The required work activities to satisfy the project's mission need are logically linked in a Schedule Baseline integrating the entire work scope while reflecting all programmatic constraints. The Cost Baseline is based on validated cost estimates developed for the project work scope and ensures resources for labor, services, subcontracts, and materials are established at the requisite levels. In total, these three baselines produce the Integrated Project Baseline. The Integrated Project Baseline lays the foundation through which project objectives can be achieved and progress can be managed and monitored during project execution. Data that form the Integrated Project Baseline is recorded in an integrated cost/schedule database using the Cost and Schedule Management Systems. These systems share the data to produce a resource-loaded schedule and time-phased budget plan.

303.1 Performance Measurement Baseline

- A. Once the Integrated Project Baseline has been validated by project management, this baseline becomes the Performance Measurement Baseline. This time-phased budget plan encompasses all the individual work activities at the Cost Account level with the dollars and resources necessary to accomplish them. Within the Performance Measurement Baseline, any budget not yet specifically identified with a Cost Account may be designated Undistributed Budget. Undistributed Budget is a transient amount and should be allocated in a reasonably timely manner. The Performance Measurement Baseline sets the criteria against which actual performance is measured during project execution. For Jefferson Lab projects over \$5M dollars, an Earned Value Management System will be implemented to assess the value of the accomplished work against the planned budget (i.e., the Performance Measurement Baseline) in order to identify problem areas early and develop a recovery plan.
- B. The Earned Value Management System employs three sets of project data to provide project management with insight into the progress of the project. From the Performance Measurement Baseline, the Budgeted Cost of Work

Scheduled (BCWS) can be established. This metric represents the sum of the time-phased budgets established for all effort scheduled to be accomplished within a given time period. BCWS can be called “Planned Value.” At the project completion time point, the BCWS should equal the Budget At Completion (BAC). BAC is the budgetary goal for accomplishing all of the authorized work contained in the cost accounts. While BCWS is derived from project planning, Budgeted Cost of Work Performed (BCWP, the second set of data) is determined during project execution. BCWP, or “Earned Value,” is the sum of the time-phased budgets for work completed during a specified time period; i.e., the value of the work accomplished. The third set of data, also collected during project execution, is Actual Cost of Work Performed (ACWP) or “Actual Costs.” Actual Costs are the project costs incurred and recorded in accomplishing the work performed (i.e., Earned Value) within a given time period. With these three earned value metrics, project management can evaluate the status of the project in relation to the technical, schedule, and cost baselines established for the project. An Estimate At Completion (EAC) can be calculated that sums the actual costs incurred to date plus the estimate of costs for all authorized work remaining. Additional detail on the Earned Value Management System is provided in chapters 600 Progress Status and 700 Analysis and Reporting of the Project Control System Manual.

304 Exhibits

5. Baseline Milestones Example
6. Intermediate Milestones Example
7. Detail Schedule Example
8. Cost Sheet Example
9. Cost Account Plan Example

Exhibit 5. Baseline Milestones Schedule Example

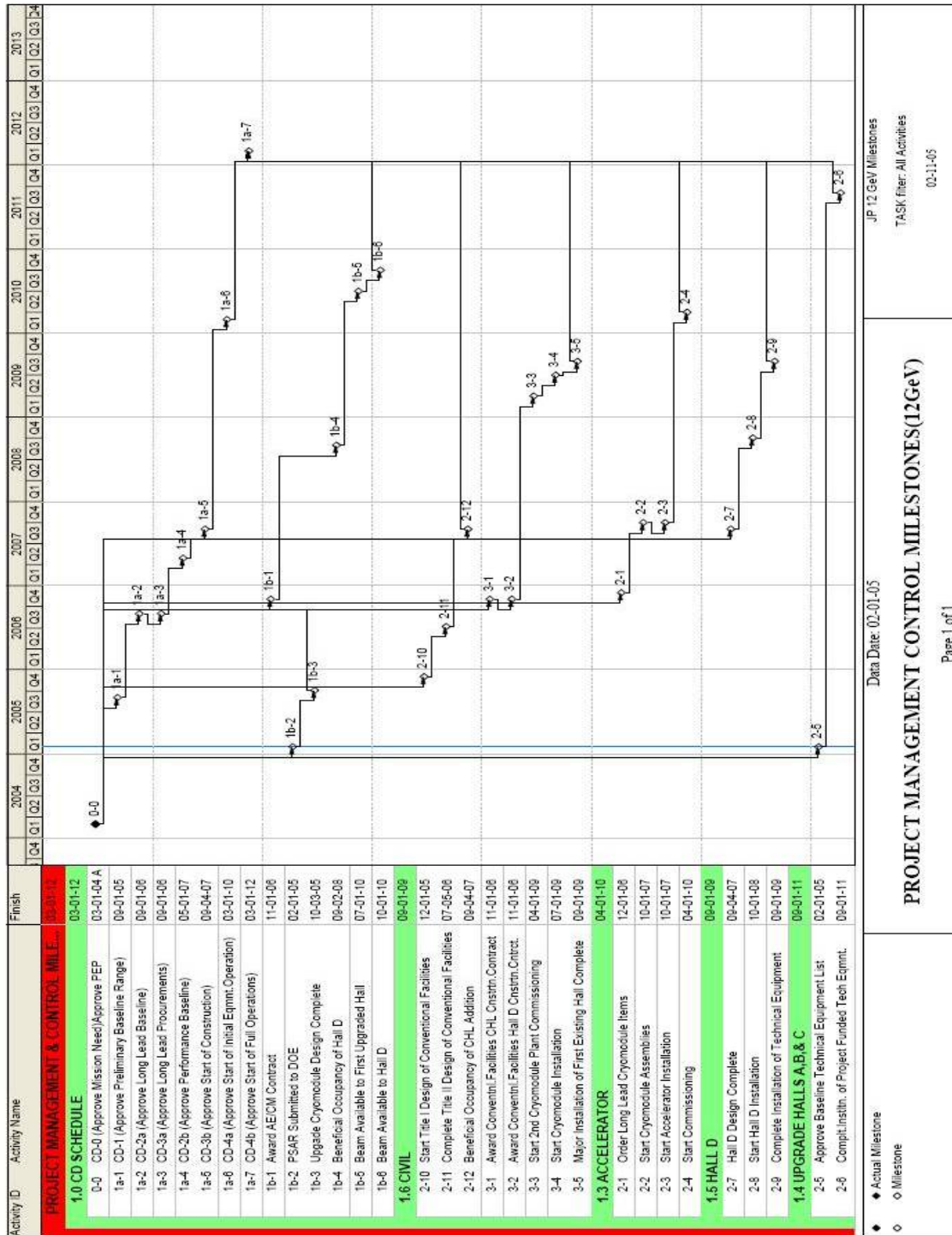


Exhibit 6. Intermediate Milestones Schedule Example

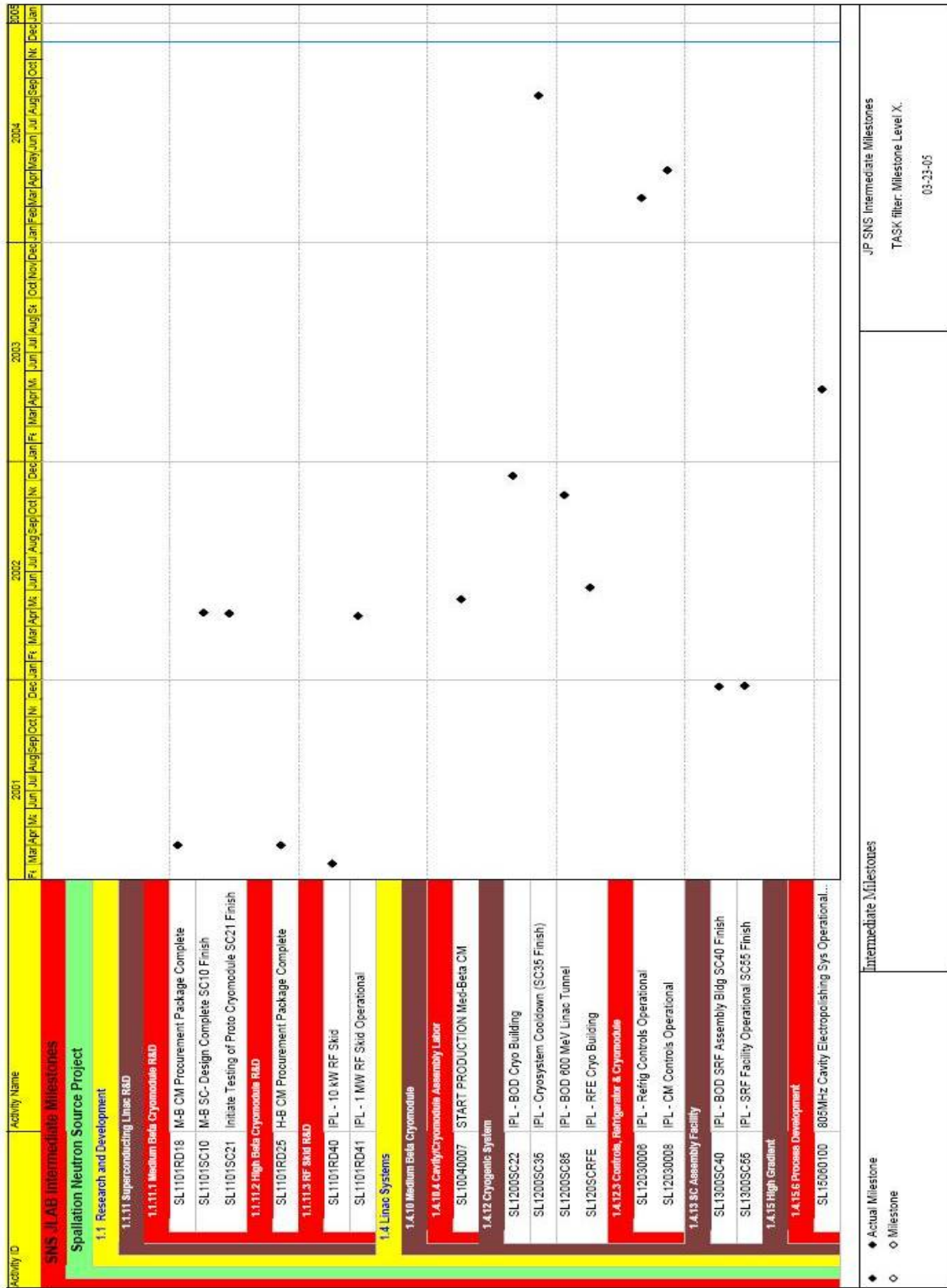


Exhibit 7. Detail Schedule Example

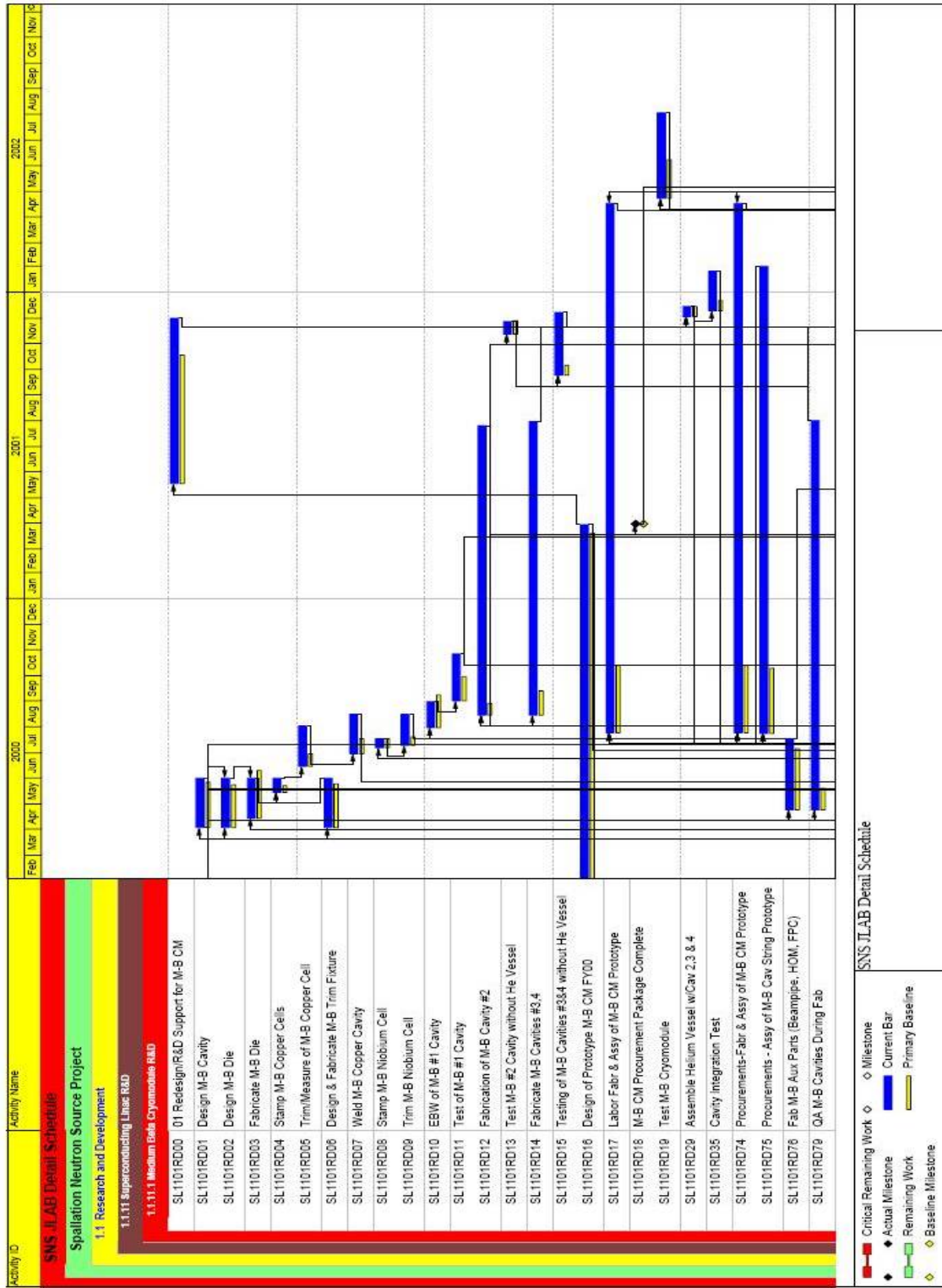




Exhibit 8. Cost Sheet Example

1.3.3.1.1	Compressors				Construction - Accel Systems			06/02/05	15:34	Data Entry
DESCRIPTION:	12 GeV CHL Main warm helium compressor equipment purchase and field placement installation costs									
INHOUSE LABOR (MANWEEKS)							ETC PURCHASED LABOR (MW's)			
	Weekly Rate	ETC	Sum Total		Weekly Rate	ETC	Sum Total		ETC	Sum Total
Plant Eng	2.2				Elect Engr	2.3	4 MW	\$9 K	Mech Engr/Dsgn	
Plant Dsgn	1.5				Elect Dsgn	1.5	4 MW	\$6 K	Mech Tech	
Plant Tech	1.3				Elect Tech	1.4	6 MW	\$8 K	Elect Engr/Dsgn	
Skilled Trades	1.3				Proj Admin	2.6			Elect Tech	
Mech Eng	2.3	4 MW	\$9 K		Scientists	2.4			Electrician	
Mech Dsgn	1.5	4 MW	\$6 K		Comp Scientist	2.1			Plumb/Weld	
Mech Tech	1.3	16 MW	\$21 K		Office	1.0			Rtg&Oper	
Contributed University Labor					Paid University Staff	1.9			Laborer	
Visiting Users	0.7				Paid University Student	0.5			Consultant (\$)	
	FY __ Actuals + Committed	FY __ Actuals + Committed	FY __ Actuals + Committed	Cost + Committed To Date Total	Estimate to complete in FY05 \$	Estimate at Completion	FY __ Review Cost Estimate in FY __ \$	Variance	%	Contingency
Labor	Manweeks				38	38		-38		
FTE Years					0.9	0.9		-0.9		
TOTAL LABOR \$					60 \$K	60 \$K		-60 \$K	15.0%	9 \$K
\$ per FTE YEAR	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	\$70 K	\$70 K		\$70 K		\$70 K
Supplies & Materials										
Travel										
Consult & Prof Labor										
Machine Shop Labor										
TOTAL EXPENSES									#DIV/0!	
Major Components/A&E < \$50K					\$228 K	\$228 K		-\$228 K		\$46 K
Major Components/A&E > \$50K					\$3,550 K	\$3,550 K		-\$3,550 K		\$710 K
TOTAL PROCUREMENTS					\$3,778 K	\$3,778 K		-\$3,778 K	20.0%	\$756 K
Total Costs (No overhead)					\$3,838 K	\$3,838 K		-\$3,838 K	19.9%	\$765 K
Labor w/overhead					\$66 K	\$66 K		-\$66 K		\$10 K
Expenses w/overhead										
Procurement w/overhead					\$3,801 K	\$3,801 K		-\$3,801 K		\$760 K
GRAND TOTAL					\$3,867 K	\$3,867 K		-\$3,867 K		\$770 K
YEAR	FY 2004/05	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012+	Total	
LABOR - Obligation					\$66 K				\$66 K	\$10 K
EXPENSES - Obligation										
PROCUREMENTS - Obligation				\$1,405 K	\$2,105 K	\$291 K			\$3,801 K	\$760 K
PROCUREMENTS - Cost										
TOTAL				\$1,405 K	\$2,171 K	\$291 K			\$3,867 K	\$770 K
ESCL TOTAL				\$1,515 K	\$2,355 K	\$329 K			\$4,243 K	
MANWEEKS	FY 2004/05	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012+	Total	
Plant Eng										
Plant Dsgn										
Plant Tech										
Skilled Trades, Electrician										
Mech Eng					4 MW				4 MW	
Mech Dsgn					4 MW				4 MW	
Mech Tech					16 MW				16 MW	
Elect Engr					4 MW				4 MW	
Elect Dsgn					4 MW				4 MW	
Elect Tech					6 MW				6 MW	
Proj Admin										
Scientists										
Comp Scientist										
Office										
Contributed University Labor										
Visiting Users										
Paid University Staff										
Paid University Students										
TOTAL MANWEEKS					38 MW				38 MW	
EXPENSES - Obligation	-	-	-	-	-	-	-	-	-	-
PROCUREMENTS <50K	-	-	-	50	50	128	-	-	228	
PROCUREMENTS >50K	-	-	-	1,350	2,050	150	-	-	3,550	

Exhibit 9. Cost Account Plan Example

A		B		C		D		E		F		G		H		I		J		K		L		M		N		O																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
Cost Account Plan (CAP) for WBS:				Approval Signature / Status				Cost Account Manager				Unassigned				Save CAP				Save, Submit																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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WBS Description:				Gray highlighted values on this sheet are linked to the corresponding WBS Cost Sheet (C/S)				Cost Sheet Minus CAP Prime Total \$'s				CAP Prime Total \$'s				C/S Prime Total \$'s				C/S Prime Total \$'s				C/S Prime Total \$'s				C/S Prime Total \$'s																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
Tech labour; E&D: two gap coil assemblies for 4" poles, iron gap-plugs for AB and AI cores, H Steel for AA and AI cores, Steel on Trapezoid magnets, replacement magnets (AM, AN, AV, AU, AL), new 3m VR, new																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															

U. S. Department of Energy



Thomas Jefferson National Accelerator Facility

400 Work Authorization System

400 Work Authorization System

A work authorization system is required during the project execution phase to control the flow of work to be accomplished within the authorized project budget. This formal procedure is used to sanction project work ensuring all activities are performed at the correct time and in the proper sequence. Limits are imposed on managers in their authority to commit and expend resources that will be charged to the project. These limitations provide assurance to the Project Director/Manager that no work is authorized unless it has been properly planned and funded. Work authorization is the specific mechanism where Cost Account Managers receive the authority to begin the work defined in their validated and approved Cost Account Plans.

401 Work Authorization Process

- A. After the Project Customer has given the project team official authority to commence work and funding has been provided, the work authorization process is employed to initiate project execution. The authorization process is a key communication link between senior project management and the Cost Account Managers because it confirms the cost, schedule, and the scope of work required to meet project objectives. Cost Account Managers are formally delegated the responsibility for their work scope and the schedule and budget parameters for its performance.
- B. Normally, it will be the Project Director/Manager who will issue a Work Authorization Form (Exhibit 10) to the Cost Account Managers at the appropriate period in the project schedule. The Work Authorization Form with approval signatures empowers the Cost Account Managers to implement their Cost Account Plan within the identified funding ceiling. OPM will send a memo to the Chief Financial Office directing that Cost Account Numbers be open to allow charges.
- C. The Office of Project Management will maintain a Work Authorization Log (Exhibit 11) that will list all approved Work Authorization Forms. The authorization status will be annotated as closed, open or completed.

402 Specific Authorizations

402.1 Cost Account Labor Authority

Authority for a Cost Account Manager to apply labor resources to work scope contained within the Cost Account is contingent upon:

- (1) the Cost Account Manager receiving delegation of signature authority for timesheets from the Associate Project Manager according to procedures established in the Jefferson Lab Administrative Manual,
- (2) the Cost Account Manager receiving approval from the Associate Project Manager and the Project Director/Manager documenting the Cost Account Plan for accomplishing the applicable work scope, and
- (3) the Chief Financial Office receiving a memo from the Project Director/Manager directing the Cost Account Number(s) to be opened associated with the work scope contained in the Cost Account Plan(s).

402.2 Procurement Authorization

Authority for any individual to commit project funds to outside vendors for delivery of products or services is limited to only those persons duly appointed as Jefferson Laboratory contracting officers. A contracting officer's authority to commit project funds is formally defined by Jefferson Lab Business Services Department Procurement Policies and Procedures.

403 Exhibits

10. Work Authorization Form
11. Work Authorization Log



Exhibit 10. Work Authorization Form

WORK AUTHORIZATION FORM
(Project Name)

Cost Account Information

WBS #	Fiscal Year
WBS Title	
Planned Start Date	Projected Finish Date
FY Funding Ceiling \$	

Work Authorized

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

Approvals

Project Services Manager	Date
Associate Project Manager	Date
Project Director/Manager	Date

Acceptance

Cost Account Manager	Date
-----------------------------	-------------

Exhibit 11. Work Authorization Log

[illegible]

U. S. Department of Energy



Thomas Jefferson National Accelerator Facility

500 Accounting

500 Accounting

- A. The Jefferson Lab Financial Management System is a key component of the Earned Value Management System. The purpose of the accounting system is to collect the actual costs incurred by a project, which when compared with Earned Value data, can provide project management with the status of a project's budget. Labor (in-house and contracted) and purchased material/equipment represent the bulk of a project's expenses. Accurate accounting for both expense categories is essential to gaining a true understanding of how a project is performing with regards to the Performance Measurement Baseline.
- B. There are five paths for project costs to enter the accounting system:
 - 1. Labor (payroll) via time sheets.
 - 2. Accounts payable via purchase order (PO) voucher.
 - 3. Travel via expense report.
 - 4. Accounts Payable via A/P voucher.
 - 5. Journal Entry.
- C. All costs are assigned a Project-Organization-Account (POA) number which provides identification to the proper cost account.

501 Cost Collection and Control**501.1 Labor**

- A. The accounting system source data for payroll entries is the Time Sheet for each individual. These time sheets are filled out twice each month by the individual employee. Time sheets must be signed electronically by the individual employee attesting to the time worked or by a supervisor or division coordinator in their absence. The time sheets are then electronically counter-signed by an individual authorized to approve labor charges. In some cases an additional project signoff is required based on project requirements.
- B. Completed time sheets are received electronically in the Payroll Department. Costs are not entered into the payroll system directly. They are first captured in the timesheet module which allocates the cost to the cost accounts. Because Jefferson Laboratory is on a semi-monthly payroll system, the number of hours a person works in a pay period will vary.

- C. Each month, the Project Status Report (Exhibit 12) provides a breakout of labor costs for each POA. This report is available on the Jefferson Lab MIS web portal to Cost Account Managers, Associate Project Managers, and the Project Director/Manager for review and verification.

501.2 Accounts Payable via Purchase Order Voucher

A. Processing of Purchase Requisitions

A Purchase Requisition (PR) is required for the acquisition of all Jefferson Lab goods and services except items purchased via a JLab P-Card or non-PO related items such as utilities, subscriptions, etc. The PR is generated online via the Lab's REQS system by the requesting project office and must include a description of the goods/services required, the appropriate Project/Organization/Account (POA) number, and a cost estimate. The PR is routed electronically for signature approval based on the value of the request (PRs > or = \$25K (> or = \$50k after 10/1/05) are routed manually for all signatures and Chief Financial Office approval).

B. Procurement Objectives and Constraints

In processing PRs and placing Purchase Orders (PO) with vendors, the Procurement and Services Department (PSSD) must provide timely support to requisitioners in accordance with Jefferson Lab's Procurement Policies and Procedures, which are approved by the Department of Energy. Procurement guidance is available on the Lab's website to assist requisitioners in processing their requirements.

C. Processing of Purchase Orders

1. When the PSSD reaches agreement with a vendor to provide the goods or services requested, a formal Purchase Order (or subcontract) is awarded/generated or the purchase is made on a credit card. At this time, the requisition becomes a PO (or subcontract) and is entered into the laboratory's Financial Management System. Status of the PO is available through the Lab's REQS system.
2. The accounting system tracks these commitments by the POA number, and reports the commitment information until the goods or services are received. A commitment can be reviewed in the month-end Outstanding Commitment Detail report, which is summarized by POA number. The total commitment for a POA can be viewed in the Job Status Report in the column labeled 'Commitments'. For multi-year procurements, only the dollar amount actually obligated to the vendor in the approved phase of the contract is included in the commitment listings. (For example, a

phased contract with a total value of \$10,000,000 might only reflect a current-year commitment of \$300,000. According to a schedule stated in the contract, the remainder will become a commitment shortly after the beginning of each new fiscal year upon written notice to the vendor via a contract modification.)

3. When goods are received by Jefferson Laboratory, they are entered into the system by Shipping and Receiving, and both a receiving report and the goods are forwarded to the requisitioner for acceptance. At this time, the goods are classified as "received but not booked," but are still recognized as commitments in the laboratory reporting mechanism. At month end, commitments that have been received but not yet invoiced are accrued as costs and are not reported as commitments. This entry is reversed immediately in the next period and received items are recognized as open commitments.
4. When an invoice is received and approved for payment, it is entered into the financial system. Once there is a line-by-line match between the Purchase Order, the receiving report (services don't have a receiving report), and the invoice, the invoiced amount is removed from the commitment list and added to the Other Direct Cost (ODC) detail report. It also moves on the Project Status Report from the commitment column (a net decrease) to the current, year-to-date and cumulative cost columns of the Project Status Report (a net increase). These amounts are used by the Office of Project Management at the end of the accounting period as part of the Earned Value reporting.
5. Actual payment of the invoice is not important in the tracking by a Cost Account Manager (CAM). It is a financial function and depends on the terms and conditions of the Purchase Order.
6. For large service contracts, the process described above may result in understated actual costs if the vendor/subcontractor delays the submittal of an invoice or if the submittal falls just after the normal close of the accounting period. For selected contracts, where the average expected invoice for the contract exceeds a threshold selected by the Project Director/Manager (currently \$100,000 per month), special procedures are used to accrue costs ahead of the invoice.
7. For large contracts with progress payments, the CAM provides signed documentation to Finance identifying costs to be reflected, as an accrual, in the actual expense reports for the month. This entry also removes these anticipated costs from the commitments total. The amounts are consistent with the completion of the contract reported by the contractor and confirmed by the Contracting Officer's Technical Representative (COTR).

The difference between the accrual and the actual expense is recognized when the invoice is received and approved for payment.

8. For large contracts with payments based on actual receipts of material, Finance accrues costs based on the receiving report entered into Financial Management System. Again this entry removes these anticipated costs from the commitments total, and the difference between the accrual and the actual expense is adjusted when the invoice is received and approved for payment.
9. Each month, the Project Status Report lists material and service expenses and commitments by POA.

501.3 Travel

- A. Travel is initiated by a Travel Authorization Request. This form includes a total estimate of the trip cost, the proper POA number, a list of any prepayments (e.g. for registration) needed, and the signature of a person authorized to approve travel on that POA, generally the traveler's supervisor. Travel arrangements are coordinated through the JLab travel agent by travel coordinators in the divisions. The Travel Authorization Request is sent to Travel Services.
- B. After completion of the trip, a Travel Expense Voucher is prepared and signed by the traveler. If actual expenses exceed the estimate on the Travel Authorization Request by 25% or more, a signature is required by a person authorized to approve the POA charges. Original receipts over \$50 are required before payment. The completed forms are sent to Travel Services and may be selected for further audit. The traveler's expenses are then reimbursed based on the Administrative Manual - Travel Section. The cost data are recorded in the accounting system assigned to the specific POA appearing on the approved Travel Expense Report.

501.4 Accounts Payable via A/P Vouchers

A/P Vouchers are used to pay for non-purchase order expenses (e.g., utilities, honorariums, petty cash reimbursements, JRT registration, subscriptions, etc.) Since there is no PO or system entered receiving, these vouchers require approval by appropriate division personnel prior to data entry. Project cost is identified at time of voucher distribution posting.

501.5 Journal Entry

A Journal Entry is used to accrue various types of costs. Examples are materials received not yet vouched, credit card purchases, estimated travel expenditures,

stockroom withdrawals, etc. Journal entries are also used for adjusting / correcting the classification of costs to the proper POA.

501.6 Cost Reporting

- A. The projects module of the accounting system is used for cost reporting. The Project/Organization/Account numbering convention, shown below, makes reporting labor and material costs easy for tracking. The costs are reported by project and/or organization and account combination.

Project Code: XXXXXX . XXXXXXXXXXXX . XXX . XXX

Organization Code: X . XX . XXX . XXXX

General Ledger
Account Code: XXXX - XXX

1. The project codes are made of 4 levels. Level 1 is the top level summary and consists of six alphanumeric characters and is used to roll-up projects. Level 2 consists of 10 alphanumeric characters and is used as a second level roll-up. Level 3 consists of 3 alphanumeric characters and can be used as a roll-up of detail projects. Level 4 consists of three alphanumeric characters and is used as a detail project identifier.

Example (for 12 GeV WBS 1.1.2.1):

12GEV1 . KB01021RD1 . 112 . 100

Level 1 - overall project number

Level 2 - funding source provided by Project Customer and computer supplied during data entry

Level 3 - first three WBS levels (ex. 112 is the 12GeV R&D for Hall A)

Level 4 - next three WBS levels - in this case, only WBS level 4 is defined, so the last two digits are zeros

2. The organization code consists of 4 levels. Each level rolls-up to the level above it. Level 1 is intended to roll-up to the Lab level. Level 2 is used to indicate the division. Level 3 identifies the department within the division. Level 4 is used as the detail organization code.
3. The general ledger account code identifies direct or indirect costs and the specific type of expense as related to the Chart of Accounts.

- B. The projects module in the Project Management System and the Project Status Report permit Finance and Project Management to track costs for the life of the project.

501.7 Inventories

Jefferson Lab maintains a stock supply inventory. Monthly distribution of these costs is based on actual withdrawals and charged to the using POA.

501.8 Machine Shop Service Center Costs

The Machine Shop Service Center performs in-house machining services (jobs) at Jefferson Lab for various Projects/Organizations as requested. The in-house machining costs include salaries, fringe benefits, statutory payroll expenses, and other direct costs associated with operating the machine shop. These costs are allocated based on the actual number of machine shop labor hours used for each job. A target hourly rate is developed, monitored, and charged throughout the year. At year end, the target rate is replaced with the actual rate which is applied retroactive to all jobs for the fiscal year.

501.9 Indirect Costs

- A. The Chief Financial Office is responsible for managing all indirect costs (fringe benefits and General & Administrative expenses) at Jefferson Lab. Fringe benefits are made up of two Fringe pools, Fringe and Statutory Fringe. The Fringe pool is comprised of non-productive labor (e.g., vacation and sick leave), health premiums, retirement, and life insurance premiums. The Statutory Fringe pool is comprised of those items required by law: social security tax, workers compensation and unemployment. These estimated costs are shown separately from labor charges on the monthly Project Status Report. Target fringe rates are calculated at the beginning of the fiscal year and monitored monthly. If there is a major deviation from the target, the rate is changed in the accounting system and retroactively adjusted back to the beginning of the fiscal year. At the end of the fiscal year, the target rate is changed to equal the actual rate in order to reflect the year-to-date adjustment in the current month. The productive labor of employees entitled to benefits is burdened with both fringe pools.
- B. General & Administrative (G&A) indirect costs are those costs which cannot be identified to a specific program or work task. They are initially charged to an intermediary cost objective and then allocated across the Jefferson Lab. G&A costs include salaries, fringe benefits and supporting costs of administrative, management, and technical staff having Laboratory-wide oversight and support responsibilities. This pool also includes telephone, site plant maintenance, utilities (excluding electricity for the accelerator) and other

costs that support the Lab's infrastructure. These costs are allocated over all direct costs, including previous allocation of the fringe benefit pool and statutory payroll expense pool, but excluding the portion of a single direct procurement or modification greater than \$50K. At year end, the total target rate for the year is replaced with an actual rate that is applied to all cost accounts in proportion of direct costs for the year excluding the portion of a single direct procurement or modification > \$50K.

501.10 Interface of Accounting System and Project Control System

Each month, the Office of Project Management downloads actual cost data and commitments by POA from the Financial Management System. This file is then imported into the Cost Management System. Data from the Schedule Management System is then uploaded into Cost Management System to measure the actual costs against the schedule and planned costs to provide Cost and Performance Reports.

501.11 Correction of Mischarges

Cost Account Managers identify incorrect charges and submit corrections, to Finance, for appropriate action.

501.12 Closing of Cost Accounts

The Office of Project Management identifies Cost Accounts for which work has been completed (i.e., cumulative BCWP equals BAC) or for which there is no work scheduled during the year. They then meet with affected Cost Account Managers and determine if the Cost Accounts should be closed. OPM takes appropriate action when deemed necessary.

502 Material Accounting System

- A. The Material Accounting System provides full accountability of all material procurements as well as for project subcontract effort. Material items purchased for Jefferson Lab projects are managed in accordance with the Jefferson Lab Property Management Manual to ensure that all property is properly acquired, inventoried, utilized and disposed. The Jefferson Lab Procurement Policies and Procedures Manual describes how subcontract requisition is administered. Cost accumulation for these two procurement elements and assignment to the appropriate Cost Accounts are handled by the Lab's Financial Management System.
- B. This accounting system also provides for effective performance measurement of material acquisition and subcontract effort. Planned purchases of material

items and subcontract work are listed as activities in a project's Control Account Plans. Projected procurement dates are assigned to these activities, thus integrating material/subcontract acquisition into the project's time-phased budget. Earned value for materials is normally credited when the item arrives at the Jefferson Lab Shipping and Receiving Office and is accepted by the Cost Account Manager. Earned value for subcontract effort is recognized when the work has been completed. As with direct labor, actual costs for material items and subcontract work are charged to the appropriate Cost Account by use of the Project-Organization-Account number. Actual costs for material/subcontract effort should be reported in the same accounting period that earned value is taken. This practice prevents distortions in the performance measurement data that would reflect incorrect progress status. In situations where earned value is claimed but the invoice has not been paid, estimated actual cost may be incorporated into the actual cost database from purchase order information.

503 Exhibits

12. Project Status Report



Exhibit 12. Project Status Report


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Status Report

For Fiscal Year 2005 Period 1

PROJ: SNS840
 PROJ ID: SNSXXX.8202010000.408.400
 PROJ NAME: ES&H & QA/QC Support
 PROJ MANAGER:

	CURRENT PERIOD INCURRED	TOTAL YTD INCURRED	OPEN PO COMMITTS	PENDING (Credit Cards, PR, Stock, Travel)*	FY05 SPENDING	TOTAL BUDGET (-% OF DIRECT BUDGET SPENT)	REMAINING BUDGET	TOTAL CTD INCURRED
LABOR								
Direct Labor	0	0	0	0	0	0	0	0
Statutory Fringe(0.000%)	0	0	0	0	0	0	0	0
Fringe Benefits(0.000%)	0	0	0	0	0	0	0	0
TOTAL LABOR	0	0	0	0	0	0	0	0
EXPENSES								
Supplies & Materials(6043)	0	0	0	0	0	0	0	0
TOTAL EXPENSES	0	0	0	0	0	0	0	0
TOTAL DIRECT	0	0	0	0	0	0	0	0
OVERHEAD								
G&A(30.000%)	0	0	0	0	0	0	0	0
TOTAL WITH OVERHEAD	0	0	0	0	0	0	0	0

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Thomas Jefferson National Accelerator Facility

600 Progress Status

600 Progress Status

This chapter of the Project Control System Manual explains how the performance status is determined during the implementation of the project plan. On a monthly basis, actual project work, schedule and cost data are collected and then compared to the Performance Measurement Baseline using an earned value methodology. Ensuring the collected data are valid and accurate is crucial to producing credible progress status reports. This knowledge of the project status aids all levels of project management in taking proper corrective action when deviations to the project plan surface.

601 Earned Value Management Indicators

There are three basic sets of indicators in an Earned Value Management System. It is through these metrics that a project's current schedule and cost status can be established and a final completion date and cost for the project can be estimated. Data for these indicators are normally measured in dollars (\$).

601.1 Planned Value

The first data set generated by a project is the Budgeted Cost of Work Scheduled (BCWS) or Planned Value. Planned Value is that segment of the total cost estimate planned to be spent on a project activity. This data set is derived from the Performance Measurement Baseline established during the project's planning phase where the work scope is scheduled and budget levels are assigned to the scheduled work. It is calculated cumulative to date by summing the budgeted value of work packages planned to be accomplished from the start of the project to the end of the accounting period.

601.2 Earned Value

A. Data for Budgeted Cost of Work Performed (BCWP) or Earned Value are collected during project execution by measuring the progress of the Cost Account work packages. When measuring Earned Value for a project, there are many methods available to assess the status of each Cost Account activity. Projects at Jefferson Lab normally make use of two of these methods:

1. Percent Complete: At the end of each status period, the Cost Account Managers assess the progress of each activity in their Cost Accounts and provide a percentage of the work in that activity that has been completed. Almost all of a project's work activities will use this primary method of determining Earned Value. To the maximum extent possible, objective measurements such as number of drawings completed and number of lines of codes written versus the budgeted value are used to calculate percent

complete. If the method of determining percent complete is subjective, the activity length is restricted to no more than three months.

2. Level of Effort: A Level of Effort activity is work that does not readily lend itself to measurement of discrete accomplishment. Level of Effort is measured only in terms of resources actually consumed within a given time period. It is generally characterized by a uniform rate of activity over a specific period of time and thus Earned Value is always equal to Planned Value. Earned Value for project management activities is usually determined in this manner.

- B. Earned Value is the cost originally budgeted to accomplish the work packages that have been completed and can include a percent complete of work packages that are still open. Earned Value can be calculated both for the current status period and cumulative to date. When compared to Planned Value and Actual Cost, the Earned Value data provide an assessment of a project's schedule and cost performance. Without Earned Value, only planned expenditures and actual expenditures can be compared, which does not indicate how much of the planned work was actually accomplished.

601.3 Actual Costs

During project execution, costs are incurred for work accomplished. These transaction data are recorded as Actual Cost of Work Performed (ACWP) or Actual Costs. Actual Costs are determined for the current period and cumulative from the start of the project.

602 Remaining Duration

Another important data item for measuring progress on a project is remaining duration. Remaining duration is a Cost Account Manager's estimate (independent of the percent complete assessment) of the number of working days required to complete the work remaining on an activity. Remaining duration is used by the Schedule Management System in determining the project's schedule status.

603 Collection of Project Data

- A. Schedule and cost data are collected each month from the Cost Account Managers and the Jefferson Lab financial system, respectively, to establish the performance of the project. OPM will issue a call for the Cost Account Managers to complete the Status Update Report (Exhibit 13). This electronic report contains a list of the Cost Account activities. Cost Account Managers annotate in the report those activities that have started with the start date;

those activities that have been completed with the finish date; and those activities that are still ongoing with a percent complete (or Level of Effort) and remaining duration assessment. (Alternate status input methods compatible with the Scheduling Management System, such as “Contractor” may be used.)

- B. After the Status Update Reports for all Cost Accounts are completed, OPM updates the Working Detail Schedule in the Schedule Management System and conducts a time analysis of the logic network. New early/late start and finish dates, float and the critical path are calculated. Additionally, the project’s incurred costs are imported from the accounting system into the Cost Management System. With this collected project data, the OPM generates monthly reports that highlight important Earned Value Management indications of the project’s schedule and cost health.

604 Exhibits

13. Status Update Report Example

Exhibit 13. Status Update Report Example

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Task Code	Task Name	Resp. Person	Remain Duration[days]	% Complete	Actual Start Date	Actual End Date
1 UV9.0010M	Magnets Started	BIALLAS G	0	0	11/01/2004	11/01/2004
2 UV9.0015M	Magnets Completed	BIALLAS G	0	0	*	*
3 UV9.1010	GW Dipoles out for Bid	BIALLAS G	0	100.00	10/01/2004	10/29/2004
4 UV9.1015	Fabrication of 4 GW Dipoles	BIALLAS G	35	0	02/02/2005	*
5 UV9.2102	Procure Generic Girdler Material	BIALLAS G	0	100.00	10/01/2004	12/23/2004
6 UV9.2104	Procure Cartridges	BIALLAS G	0	100.00	03/01/2005	03/31/2005
7 UV9.2105	Engineering Oversight QX Girders/Standards Procurem...	BIALLAS G	60	15.00	10/01/2004	*
8 UV9.2110	Procurement/Fabrication of QX Girders/Standards	BIALLAS G	60	50.00	10/01/2004	*
9 UV9.2202	Procurement/Fabrication of QX/SC Girders/Standards	BIALLAS G	40	0	*	*
10 UV9.2205	Engineering Oversight to Fabricate QX & SC Girders/...	BIALLAS G	19	10.00	11/02/2004	*
11 UV9.2305	Engineering for QX Quad Procurement	BIALLAS G	0	100.00	02/01/2005	02/28/2005
12 UV9.2310	Procurement of QX Quad Procurement	BIALLAS G	0	100.00	02/01/2005	02/28/2005
13 UV9.3005	SC Sextupole Procurements, Mach Shop	BIALLAS G	100	5.00	12/01/2004	*
14 UV9.4000	Supplies & Equipment to Fabricate GA Trims	BIALLAS G	30	0	*	*
15 UV9.6100	Engineering Oversight for Vacuum Procurements	BIALLAS G	19	20.00	12/01/2004	*
16 UV9.6102	Procure Vacuum Tube, Misc	BIALLAS G	0	100.00	12/01/2004	02/28/2005

Important Business Rule Notes:

- A blank[empty] date field is **not valid**.
- You must default the field to * to set the date to 'undefined'[empty]

Save Changes

U. S. Department of Energy



Thomas Jefferson National Accelerator Facility

700 Analysis and Reporting

700 Analysis and Reporting

This chapter of the Project Control System Manual explains how the performance status is determined, analyzed and documented during the execution of the project plan. The Integrated Project Baseline is the basis for performance analysis and reporting. Analysis provides the project team an understanding and assessment of the project and its progress. Reporting is the communication means to ensure managers comprehend the Earned Value Management information. Schedule and cost variances from the Performance Measurement Baseline are derived by analyzing a project's earned value metrics. Variance thresholds are established to enable project management to focus attention and resources on those variances with the most significance to the project. Results from the variance analyses provide the stimulus for management action to resolve project issues before they become substantial problems.

701 Variance Analysis

The purpose of variance analysis is to identify problems early so that prompt corrective action can be taken to minimize cost and schedule impacts, cost overruns, and schedule delays to the project. Variance analysis quantifies the deviations from the timed-phased budget based on the work accomplished and cost data collected. Variance within earned value management can be described by two metrics: Cost Variance and Schedule Variance. Other project performance measurements can be obtained from these two expressions. Variances can be calculated for individual Cost Accounts and summarized at higher WBS and organizational levels including the total project.

701.1 Variance and Performance Indicators (Exhibit 14)

- A. Schedule Variance (SV): difference between the Budgeted Cost of Work Performed (BCWP, Earned Value) and the Budgeted Cost of Work Scheduled (BCWS, Planned Value).

$$SV = BCWP - BCWS$$

If the result is a zero (0), the project is on schedule.

If the result is a positive (+) value, the project is ahead of schedule.

If the result is a negative (-) value, the project is behind schedule.

While Schedule Variance indicates the dollar value difference between accomplished and planned work activities, it does not specify the amount of time the project is ahead or behind schedule. Analysis of the project plan in

the Schedule Management System will reveal the status of specific activities, milestones, and critical events.

- B. Cost Variance (CV): difference between the Budgeted Cost of Work Performed (BCWP, Earned Value) and the Actual Cost of Work Performed (ACWP, Actual Cost).

$$CV = BCWP - ACWP$$

If the result is zero (0), the project is on budget.

If the result is a positive (+) value, the project is underrunning its budget.

If the result is a negative (-) value, the project is overrunning its budget.

- C. Schedule Performance Index (SPI): ratio of the Budgeted Cost of Work Performed to the Budgeted Cost of Work Scheduled and represents the schedule efficiency of the project.

$$SPI = BCWP / BCWS$$

If the result is equal to 1.0, the project is on schedule.

If the result is greater than 1.0, the project is ahead of schedule, accomplishing more work than planned for the considered time period.

If the result is less than 1.0, the project is behind schedule, accomplishing less work than planned for the considered time period.

Note: SPI will trend toward 1.0 as the project nears completion. Earned Value equals Planned Value at the end of the project, i.e., the work you planned to do is finally accomplished.

- D. Cost Performance Index (CPI): ratio of the Budgeted Cost of Work Performed to the Actual Cost of Work Performed and represents the cost efficiency of the project.

$$CPI = BCWP / ACWP$$

If the result is equal to 1.0, the project is on budget.

If the result is greater than 1.0, the project is running under budget, spending less for the accomplished work than planned for that work.

If the result is less than 1.0, the project is running over budget, spending more for the accomplished work than planned for that work.

701.2 Estimate at Completion

- A. The next step in the analysis is to evaluate the earned value data and develop a projection for the future of the project based on the progress made to date. An estimate of when the project will be completed and the cost to complete can be established.
- B. For schedule projections, there are approximation methods to arrive at an estimate of the completion date. The most common method is to divide the Schedule Variance (SV) by the average monthly budgeted cost of work scheduled (BCWS). This approximation provides a duration in months of how far a project is ahead or behind schedule, but assumes current and future work will be accomplished at the same average monthly rate. A more accurate forecast can be made by analyzing the schedule data (e.g., critical path) in the Schedule Management System.
- C. For cost projections, an Estimate at Completion (EAC) can be derived using a number of methods. The EAC is the actual cost to date on the project plus an estimate of costs for the remaining authorized work (referred to as Estimate to Complete, ETC).

$$\text{EAC} = \text{ACWP} + \text{ETC}$$

An objective ETC can be generated by a detailed “bottoms up” approach where the Cost Account Managers provide a description of the remaining activities in their accounts and an update to the estimated resources or cost for completing these activities. This comprehensive EAC method represents the best estimate of the total cost at the completion of the project and is required to be formulated at least once a year. On a monthly basis, the EAC is evaluated by the Cost Account Managers to determine if recent events and performance warrant a change to their Cost Account’s EAC. These EACs can be calculated by assuming the current Planned Value for the remaining work represents the ETC. This method for estimating the EAC assumes that all remaining work is independent of the dollar burn-rate established for the project to date.

- D. For calculating an Independent Estimate at Completion (IEAC) based solely on performance factors, there are multiple methods that can be used.

1. The first IEAC formula uses the Budget at Completion (BAC) and the Cost Performance Index to calculate IEAC:

$$\text{IEAC} = \text{BAC} / \text{CPI},$$

where BAC is the sum of all project Cost Accounts (and equal to a project's total BCWS, Planned Value).

This formula assumes that the project dollar burn-rate remains constant for the remainder of the project.

2. Another IEAC formula uses the Actual Cost, Budget at Completion, Earned Value and the Cost Performance Index to calculate IEAC:

$$\text{IEAC} = \text{AC} + [(\text{BAC} - \text{BCWP}) / \text{CPI}]$$

This formula is the same as formula 1 as long as a rebaselining that sets cost and/or schedule variances to zero has not occurred. If such an occurrence has happened, this equation should be used with the CPI being based on performance subsequent to the rebaselining.

3. Finally, the following formula considers the potential cost impact of a schedule variance.

$$\text{IEAC} = \text{BAC} / [0.8 (\text{CPI}) + 0.2 (\text{SPI})]$$

In this formula, the EAC is weighted by 80% of the CPI and 20% of the SPI.

- E. As no single technique consistently provides the best answer, the Project Director/Manager will decide which EAC method or group of methods represents the best approach for the project.

701.3 Variance at Completion

EAC (or IEAC) is used to determine the Variance at Completion (VAC) for the project. The VAC is calculated as follows:

$$\text{VAC} = \text{BAC} - (\text{I})\text{EAC}$$

If VAC is positive, the project is projecting an underrun; negative, an overrun.

702 Project Reports

Formal project reports are an integral part of the Earned Value Management System. Summarized project data from the cost account to the senior management reporting level provide the project management team with the insight into how the project is performing compared to the baseline project plan. Reports are generated by the Financial, Schedule and Cost Management Systems. The Financial Management System provides various cost reports and these can be found on the Jefferson Lab MIS web portal (Web Applications/Finance Related Applications). Project performance reports with earned value data will be produced by the Office of Project Management from the Schedule and Cost Management Systems. The following list of reports is the nominal set appropriate for all levels of projects at Jefferson Lab. Other management and Project Customer-specified reports can be generated by the Schedule and Cost Management Systems and tailored to the particular needs of the project. These reports will be generated by the Office of Project Management and will reside on the Jefferson Lab Network.

702.1 Financial Management System Reports

A. Open Commitments Report (Exhibit 15)

The Open Commitments Report lists those procurement items for a project that have been ordered but have not been delivered or completed.

B. Project Status Report (Exhibit 16)

The Project Status Report details the incurred costs and open Purchase Order commitments on the project including labor, expenses, and overhead (indirect cost).

C. 12 Month Report (Exhibit 17)

The 12 Month Report breaks the project costs down to a monthly level. Previous fiscal year totals are provided for labor and expenses and then for each month of the current fiscal year.

D. Spending by Month Report (Exhibit 18)

The Spending by Month Report is similar to the 12 Month Report but also provides a breakout of indirect costs (fringe benefits and G&A).

702.2 Schedule and Cost Management Systems Reports

A. Project Analysis Report (Exhibit 19)

The Project Analysis Report is the primary earned value report for the project. These reports are normally provided at WBS Level 2, but can be produced down to WBS Level 4. The report displays the BCWS (Planned Value), BCWP (Earned Value), and ACWP (Actual Costs) for the current period and as a cumulative to date. The Schedule and Cost Variances, along with the associated performance index, are provided as well as the Budget at Completion, Estimate at Completion and Variance at Completion data.

B. Red Flag Report (Exhibit 20)

The "Red Flag" report is the core of the variance reporting system. This report summarizes cumulative performance data as of the end of the accounting period and identifies those accounts with cost or schedule variances exceeding thresholds established by the Project Director/Manager. Thresholds are determined by the size of the Cost Account, the phase of the project, the level of the WBS, or the criticality of the system. Thresholds are established for the value of the variance as well as the associated performance index (see Exhibit 21). Based on these thresholds, accounts with a significant negative variance are identified by a color-coded flag on the Red Flag Report. Depending on the variance level, a yellow or red flag highlights the Cost Account. A yellow flag is a warning and indicates a slightly unfavorable variance. A red flag indicates an unfavorable variance and initiates a Variance Analysis Report. Large favorable-appearing variances are flagged with a "Note." In addition to the variance indicators, data for the Budget at Completion, Estimate at Completion, and Variance at Completion are also provided.

C. Variance Analysis Report (Exhibit 22)

Those Cost Accounts identified with a red flag require the initiation of a Variance Analysis Report. The purpose of this report is to provide project management with an understanding of the nature of the problem causing the variance and its impact to the overall project. The Office of Project Management will issue the Variance Analysis Report form to the appropriate Cost Account Manager. The Project Director/Manager individually interviews the Cost Account Manager and Associate Project Manager to determine and discuss the cause for the variance and possible corrective action to alleviate the problem. The summary of this discussion is recorded on the Variance Analysis Report form. The Office of Project Management generates a Summary Variance Analysis Report based on consolidated information from the signed Variance Analysis Reports.

D. Performance Chart (Exhibit 23)

Performance Charts are prepared each month summarizing cost performance and obligation status for the project as a whole and for each Level 2 WBS system. The cost performance graphs show BCWS (Planned Value), BCWP (Earned Value), and ACWP (Actual Cost) as a function of time. The obligation status graph shows commitments and pending obligations for the same period.

E. Performance Indicator Chart (Exhibit 24)

Performance Indicator Charts are prepared each month for the project as a whole and for each Level 2 WBS system. These graphs show the Schedule and Cost Performance data for at least each of the previous twelve months. They are useful for tracking variance trends.

F. Schedule Summary (Exhibit 25)

The report is prepared by OPM based on performance information provided by the Cost Account Managers. The report displays summary schedule information including forecast start/completion dates and actual start/completion dates. The Schedule Variance and Schedule Performance index are also provided for each element.

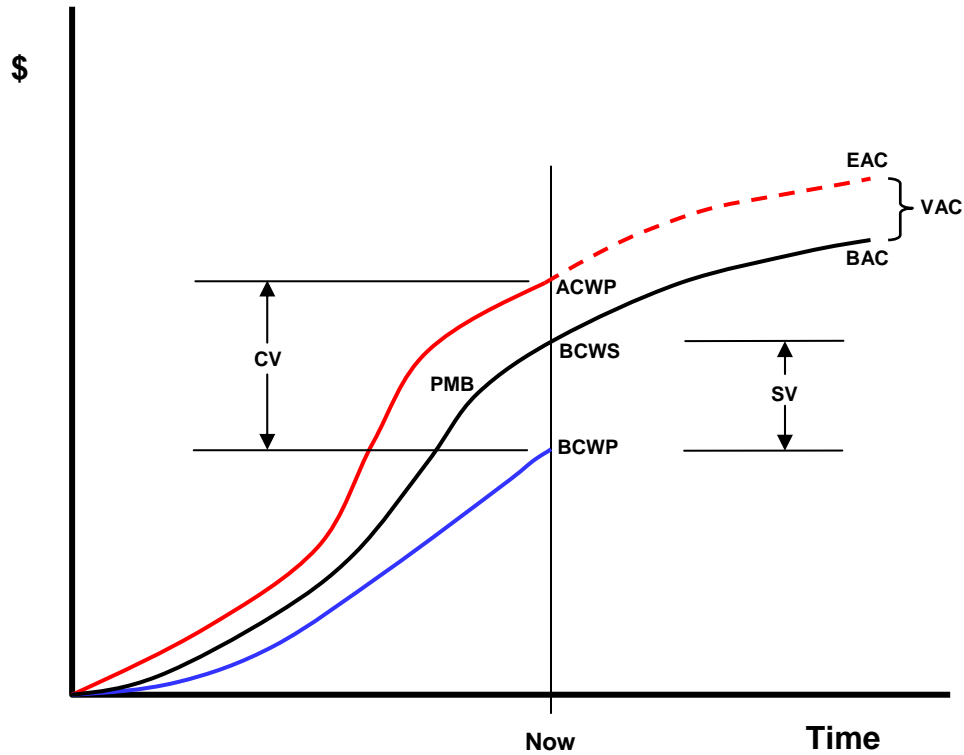
703 Meetings and Reviews

Project management initiates regularly scheduled meetings and reviews to determine project status. Early detection of technical, schedule, and cost difficulties is imperative to maintaining good project performance. The status of a project at the 15 to 20 percent completion point is an accurate indicator of the final success of the project. Depending on a project's size and complexity, the Project Director/Manager and his staff will decide on the appropriate meeting types, frequency, and required attendees. Types of meetings include executive management meetings, project staff meetings, technical and design reviews, project performance reviews, and of course, customer meetings. Open discussion at these forums will reveal specific project technical, schedule, and cost issues requiring management attention and/or decision. Addressing programmatic issues in a timely manner will help prevent greater problems in the future.

704 Exhibits

14. Earned Value Chart
15. Open Commitments Report Example
16. Project Status Report Example
17. 12 Month Report Example
18. Spending by Month Report Example
19. Project Analysis Report Example
20. Red Flag Report Example
21. Variance Threshold Flags Example
22. Variance Analysis Report Example
23. Performance Chart Example
24. Performance Indicator Chart Example
25. Schedule Summary Example

Exhibit 14. Earned Value Chart



PMB	Performance Measurement Baseline
BCWS	Budgeted Cost of Work Scheduled (or Planned Value)
BCWP	Budgeted Cost of Work Performed (or Earned Value)
ACWP	Actual Cost of Work Performed (or Actual Cost)
SV	Schedule Variance
CV	Cost Variance
BAC	Budget at Completion
EAC	Estimate at Completion
VAC	Variance at Completion

Exhibit 15. Open Commitments Report Example

SURA/JEFFERSON LAB - DOE FUND
PURCHASE COMMITMENTS DETAIL REPORT

Fiscal Year: 2005 Period: 7

Project Abrv : 12CDR

Project Name : 12 GeV CDR

Owning Org : DIRGEN

PROJ	ORG	ACCT	PO ID	PO LINE NUM	PO LINE DESCRIPTION	PO OPEN AMOUNT
12CDR	DIRGEN	8048-003	04A1614006	2	TASK ORDER 4: REIMBURSABLE ESTIMATED NOT TO EXCEED	\$1,000.00
12CDR	DIRGEN	8048-003	04A1614006	3	TASK ORDER 4: PROVIDE A-E SERVICES AS DESCRIBED	\$31,437.21
12CDR	DIRGEN	8948-003	04A1614006	3	TASK ORDER 4: PROVIDE A-E SERVICES AS DESCRIBED	\$6.29
Total PO 04A1614006						\$32,443.50
Total						\$32,443.50



Exhibit 16. Project Status Report Example


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Status Report

For Fiscal Year 2005 Period 1

PROJ: SNS840
PROJ ID: SNSXXX.8202010000.408.400
PROJ NAME: ES&H & QA/QC Support
PROJ MANAGER:

	CURRENT PERIOD INCURRED	TOTAL YTD INCURRED	OPEN PO COMMITTS	PENDING (Credit Cards, PR, Stock, Travel)*	FY05 SPENDING	TOTAL BUDGET (-% OF DIRECT BUDGET SPENT)	REMAINING BUDGET	TOTAL CTD INCURRED
LABOR								
Direct Labor	0	0	0	0	0	0	0	0
Statutory Fringe(0.000%)	0	0	0	0	0	0	0	0
Fringe Benefits(0.000%)	0	0	0	0	0	0	0	0
TOTAL LABOR	0	0	0	0	0	0	0	0
EXPENSES								
Supplies & Materials(6043)	0	0	0	0	0	0	0	0
TOTAL EXPENSES	0	0	0	0	0	0	0	0
TOTAL DIRECT	0	0	0	0	0	0	0	0
OVERHEAD								
G&A(30.000%)	0	0	0	0	0	0	0	0
TOTAL WITH OVERHEAD	0	0	0	0	0	0	0	0

Exhibit 17. 12 Month Report Example

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12 Month Report

In K \$'s
For Fiscal Year 2005

Project: SNS820
Project Name: Proj Control/Bus/Ofc Supp
Project Manager: Codren, Richard

	FY04	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	PEND- ING	TOTAL OBLGTD	TOTAL BDGT	RMING BDGT
LABOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6043 (Supplies & Materials)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6044 (Training & Development)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6045 (Travel)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6046 (Purch Serv/Labor/Consult)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6047 (EDP)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6048 (Capital Procurements)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6049 (R&M)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6050 (Utilities)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6053 (Src Center Chrgs)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6054 (Other)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6055 (Stipend/Reloc/Reg Fees)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6948 (Capital Procurements>50K)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6999 (PY Dir Cost Alloc Exempt)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Exhibit 18. Spending by Month Report Example

[Download this to Excel](#)

Spending by Month For Fiscal Year 2005

Project: SNS820
Project Name: Proj Control/Bus/Ofc Supp
Project Manager: Cothren, Richard

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YTD INCUR	OPEN COMMITTS	PEND- ING	TOTAL OBLGTD	TOTAL BDGT	RMING BDGT
Labor																		
Statutory Fringe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fringe Benefits	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Labor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expenses																		
Supplies & Materials (6043)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EDP (6047)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utilities (6050)	130	50	0	0	0	0	0	0	0	0	0	0	179	0	0	179	0	(179)
Total Expenses	130	50	0	0	0	0	0	0	0	0	0	0	179	0	0	179	0	(179)
Total Direct	130	50	0	0	0	0	0	0	0	0	0	0	179	0	0	179	0	(179)
G&A	39	15	0	0	0	0	0	4	0	0	0	(1)	58	0	0	(254)	0	254
Total With Overhead	168	64	0	0	0	0	0	4	0	0	0	(1)	236	0	0	(76)	0	76

Exhibit 19. Project Analysis Report Example

Project Analysis Report

Company
Project Name
Report Period

1
FELUV4-0

From 3/1/2005 To 3/31/2005

Page 1 of 2	Current Period						Cumulative To Date						At Completion			
	APPROGT	EV	Actuals	SV \$	CV \$	% SCH	APPROGT	EV	Actuals	SV \$	CV \$	% SCH	BAC	TCPI	EAC	VAC
				SV %	CV %	% PERF				SV %	CV %	% PERF				
				SPI	CPI	% EXPD				SPI	CPI	% EXPD				
FEL UV UPGRD UltraViolet FEL Upgrade C	0	0	0	0.00	0.00	0.00	0	0	156,115	0	(156,115)	0.00	0	0.00	156,115	0.00
FEL UV UPGRD.2.1 2.1 PROJECT MANAGEMENT	0	0	0	0.00	0.00	0.00	0	0	19,684	0	(19,684)	0.00	0	0.00	19,684	0.00
FEL UV UPGRD.2.10 2.10 WIGGLERS (Task 3)	0	0	0	0.00	0.00	0.00	0	0	0	0	0.00	0.00	0	0.00	0	0.00
FEL UV UPGRD.2.11 2.11 OPTICS	0	0	0	0.00	0.00	0.00	0	0	47,500	0	(47,500)	0.00	0	0.00	47,500	0.00
FEL UV UPGRD.2.13 2.13 COMMISSIONING (T	0	0	0	0.00	0.00	0.00	0	0	10,000	0	(10,000)	0.00	0	0.00	10,000	0.00
FEL UV UPGRD.2.2 2.2 FACILITY	0	0	0	0.00	0.00	0.00	0	0	0	0	0.00	0.00	0	0.00	0	0.00
FEL UV UPGRD.2.3 2.3 BEAM PHYSICS	0	0	0	0.00	0.00	0.00	0	0	0	0	0.00	0.00	0	0.00	0	0.00
FEL UV UPGRD.2.4 2.4 INJECTOR	0	0	0	0.00	0.00	0.00	0	0	0	0	0.00	0.00	0	0.00	0	0.00
FEL UV UPGRD.2.5 2.5 SRF	0	0	0	0.00	0.00	0.00	0	0	0	0	0.00	0.00	0	0.00	0	0.00
FEL UV UPGRD.2.6 2.6 RF	0	0	0	0.00	0.00	0.00	0	0	0	0	0.00	0.00	0	0.00	0	0.00
FEL UV UPGRD.2.7	0	0	0	0.00	0.00	0.00	0	0	0	0	0.00	0.00	0	0.00	0	0.00

Project Analysis Report

June 1, 2005

Report Rev RRD 03.02

Page 1 of 2

Exhibit 20. Red Flag Report Example

[illegible]

Exhibit 21. Variance Threshold Flags Example

Variance Reporting Thresholds

Cost or Schedule Variance >\$25K
OR CPI or SPI < 0.9 or >1.1

Warning

Cost or Schedule Variance >\$50K
AND CPI or SPI < 0.8 or >1.2

Variance Report



Exhibit 22. Variance Analysis Report Example

VARIANCE ANALYSIS REPORT (VAR)

PROJECT:

REPORT DATE:

WBS #:

INFORMATION AS OF:

WBS TITLE:

COST ACCOUNT MANAGER:

Values are in Dollars (other than SPI & CPI)	SCHEDULE VARIANCE (SV)				COST VARIANCE (SV)			
	(A)	(B)	(B-A)	(B/A)	(C)	(D)	(C-D)	(C/D)
	Planned Value	Earned Value	Schedule Variance	Schedule Perform Index	Earned Value	Actual Cost	Cost Variance	Cost Perform Index
	BCWS	BCWP	SV	SPI	BCWP	ACWP	CV	CPI
Month of May-05	15	9	-6	0.63	9	19	-10	0.49
Cumulative	132	126	-6	0.95	126	174	-48	0.72

1. Cause (Address Variances Individually)
2. Proposed Solutions (Corrective Actions) <div style="margin-top: 100px;">Estimated Resolution Date:</div>
3. Technical/Schedule/Cost Impacts:
4. Comments:
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">Cost Account Manager</div> <div style="width: 45%;">Project Director/Manager</div> </div>

Exhibit 23. Performance Chart Example

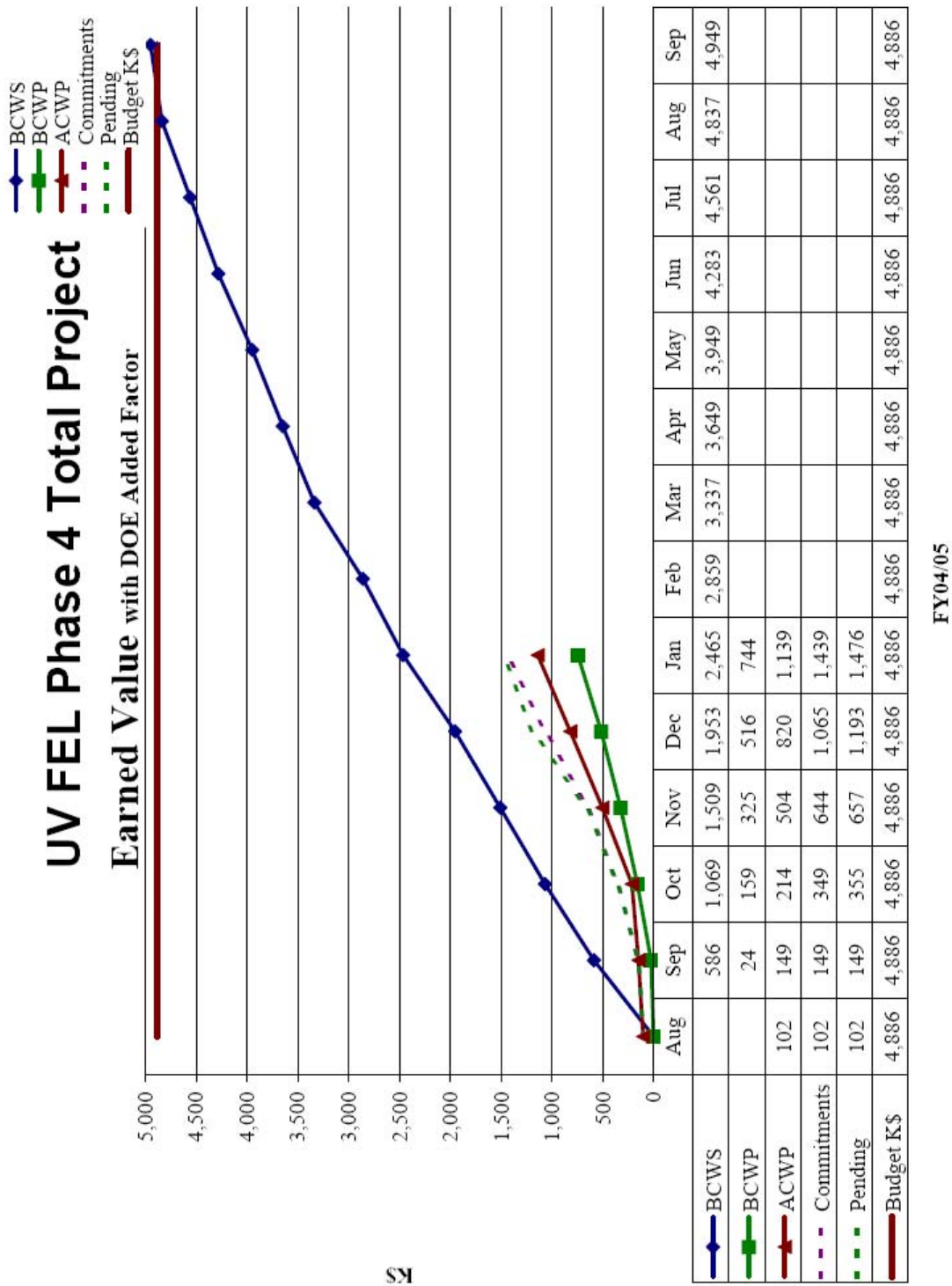


Exhibit 24. Performance Indicator Chart Example

Hunt for Red October

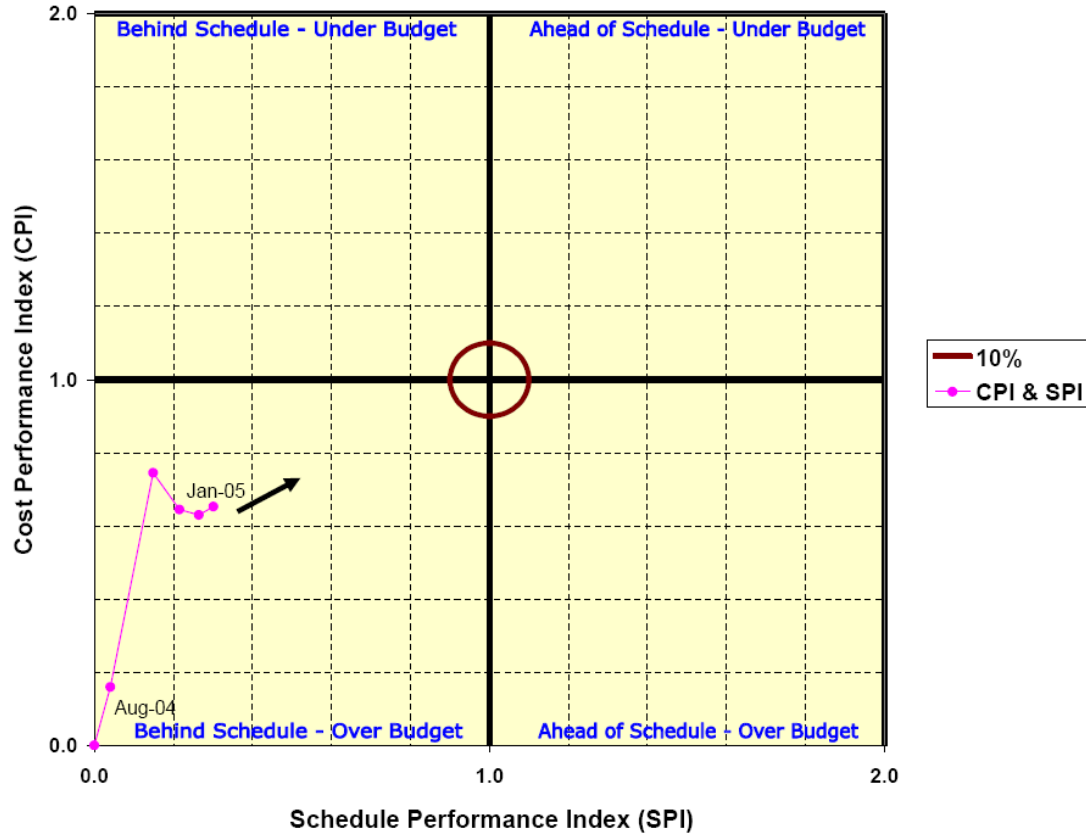


Exhibit 25. Schedule Summary Example

WBS Name	BL Start	BL Finish	Forecast Start (A=Actual)	Forecast Finish (A=Actual)	Schedule Variance	Schedule Variance Index
ULTRA VIOLET FEL UPGRADE MAY05						
2.1 PROJECT MANAGEMENT (Task 5)	01-Sep-04	18-Dec-05	01-Sep-04 A	18-Dec-05	(\$80,175)	-0.06
2.2 FACILITY	30-Sep-04	01-Dec-05	30-Sep-04 A	30-Sep-05	\$19,045	0.29
2.3 BEAM PHYSICS	01-Nov-04	16-Aug-05	01-Oct-04 A	31-Mar-05 A	\$11,923	0.63
2.4 INJECTOR	01-Nov-04	14-Oct-05	01-Oct-04 A	30-Sep-05	\$2,082	0.06
2.4.3 INJ DRIVE LASER	01-Nov-04	30-Sep-05	01-Oct-04 A	30-Sep-05	(\$68,651)	-0.63
2.4.4 INJ ADVANCED DEVELOPMENT					\$0	0.00
2.4.1 GUN	01-Nov-04	27-May-05	01-Oct-04 A	30-Sep-05	(\$68,651)	-0.63
2.4.2 INJ RF					\$0	0.00
2.5 SRF					\$0	0.00
2.5.1 CAVITIES					\$0	0.00
2.5.2 CRYOMODULES					\$0	0.00
2.6 RF					\$0	0.00
2.6.1 LOW LEVEL					\$0	0.00
2.6.2 HIGH LEVEL					\$0	0.00
2.7 CRYOGENICS					\$0	0.00
2.8 INSTRUMENTATION					\$0	0.00
2.8.1 DC POWER (UV4 PRS)	01-Nov-04	22-Nov-05	01-Oct-04 A	26-Oct-05	(\$23,991)	-0.04
2.8.2 BEAM INSTRUMENTATION 10 BV/14 BPM + PADWIG (UV4 ADP)	01-Nov-04	31-Oct-05	01-Oct-04 A	23-Aug-05	\$31,007	0.16
2.8.3 VACUUM SYSTEM (UV4 BMD)	03-Jan-05	22-Nov-05	03-Dec-04 A	19-Oct-05	\$164	0.00
2.8.4 MACHINE PROTECTION SYSTEM (UV4 MPS)	03-Jan-05	25-Oct-05	01-Nov-04 A	26-Oct-05	(\$19,761)	-0.35
2.8.5 PERSONNEL PROTECTION SYSTEM				07-Sep-05	\$4,866	0.25
2.8.6 LASER SAFETY SYSTEM (LSS)	01-Nov-04	31-Oct-05	01-Oct-04 A	06-Oct-05	\$0	0.00
2.8.7 CONTROL SYSTEM HARDWARE & SOFTWARE (UV4 SW)	01-Nov-04	31-Oct-05	01-Oct-04 A	21-Sep-05	\$4,033	0.08
2.8.8 UV CAVITY & TRANSPORT (UV4 TRA)	01-Dec-04	30-Sep-05	01-Nov-04 A	26-Oct-05	\$2,868	0.09
2.9 MAGNETS (Task 1)	01-Nov-04	21-Nov-05	01-Oct-04 A	04-Nov-05	(\$47,139)	-0.55
2.9.1 QX QIRDS/STANDS	01-Nov-04	27-Jun-05	01-Oct-04 A	03-Aug-05	(\$103,751)	-0.27
2.9.2 QX & SC GIRDER/STAND	02-May-05	27-Jun-05	02-Nov-04 A	07-Jul-05	(\$25,965)	-0.33
2.9.2.1 QX & SC GIRDER/STAND	28-Feb-05	28-Feb-05	01-Feb-05 A	03-Aug-05	(\$26,216)	-0.33
2.9.2.2 QX & SC GIRDER/STAND	03-Jan-05	24-May-05	01-Dec-04 A	28-Feb-05 A	\$251	0.00
2.9.2.3 QX MAGNETS	01-Nov-04	20-May-05	01-Oct-04 A	12-Jul-05	\$0	0.00
2.9.3 SEXTUPOLES	01-Nov-04	13-Jun-05	01-Oct-04 A	13-Jun-05	\$0	0.00
2.9.1 DIPOLES	02-May-05	13-Jun-05	02-May-05	13-Jun-05	\$0	0.00
2.9.4 TRIMS					\$0	0.00
2.9.5 ARC DIPOLES					\$0	0.00

U. S. Department of Energy



Thomas Jefferson National Accelerator Facility

800 Change Control

800 Change Control

- A. The Change Control process delineated in this section is to be used for requesting, reviewing, and documenting changes to the approved Project Baseline for projects conducted at the Jefferson Laboratory. Baseline changes may occur as a result of contractual modifications, application of undistributed budget, use of contingency/management reserve funds, replanning, or formal reprogramming. Managing changes to the Project Baseline is crucial to ensure the project's work scope, schedule, and cost do not spiral out of control. Changes to baseline documents should be minimized and are normally approved only in the interest of work scope changes, design adequacy, reliability, performance, cost reduction, or safety/environmental considerations.
- B. The purpose of the Change Control process is to ensure that:
- The cost, schedule, and technical impacts of the proposed changes are developed and considered by all appropriate parties.
 - The collected evaluations are considered in the approval or rejection of the proposed changes.
 - All appropriate parties are informed of proposed changes and their dispositions.
 - Baseline documentation is controlled and updated as appropriate to reflect approved changes.
 - Action on proposed changes occurs deliberately, but without undue delay and without interfering disproportionately with project progress.
- C. The stated goals of the Change Control process are:
- To anticipate, recognize, and predict changes to the approved Project Baseline
 - To prevent unauthorized or unintended deviations from the approved Project Baseline
 - To evaluate and understand the technical, schedule, cost and safety/quality assurance impacts of each change to the approved Project Baseline
 - To identify, understand, and control the consequences of changes to the approved Project Baseline
 - To ensure each change is evaluated, reviewed, and dispositioned at the proper authority level

801 Change Control Process

- A. The Change Control process allows the project team to identify, evaluate, approve, and document proposed changes to the Project Baseline. The process is initiated with the generation of a Change Request. The Change

Request is the formal mechanism for proposing and assessing a change, waiver, or deviation to the project. After an evaluation of the Change Request, an approval is granted at an appropriate level and a Change Order is issued to implement the change. The Change Order is expeditiously communicated to affected parties and incorporated in the Project Baseline documentation. The Change Control process is accomplished in three phases: the Request Phase, the Review Phase, and the Documentation Phase. The Request Phase is where the Change Request originates and appropriate classification is determined. For the Review Phase, an assessment of the proposed Change Request is accomplished and approval is obtained from the appropriate authority level. Approved changes are implemented and Project Baseline documents are revised in the Documentation Phase.

- B. During the course of project execution, errors in accounting and cost/schedule databases can occur. Integrity of the Performance Measurement Baseline is vital to a clear understanding of project status. Retroactive changes to the performance measurement data are to be avoided. Adjustments can be made to correct accounting and data entry errors and do not require instituting the formal change request process. Action should be taken promptly when errors are identified and will be controlled by the Office of Project Management (OPM).

801.1 Request Phase

- A. The Change Control process begins with the generation of a Change Request form (Exhibit 26). Any project team member can initiate a change to the project technical, schedule, and cost baselines by completing the Change Request form in electronic format. (Project changes as a result of customer direction, such as a change in funding levels or project scope, are called directed changes. These directed changes will be initiated by the Project Director/Manager and approved by the Project Customer before implementation). The originator fills out the Identification and Description sections of the Change Request and, if possible, completes the Change Impact Assessment section. The Change Impact Assessment section records the potential impacts of the proposed change to the Project Baseline and addresses safety/quality concerns. The impacts of not approving the change are also included. The assessment is to be all-inclusive and thorough to ensure the consequences of implementing (or not implementing) the proposed change are fully understood. The Change Request is then submitted to a member of the project Change Control Board (normally the one most affected) for consideration. Upon concurrence, the Change Control Board member signs the Change Request and identifies the affected Cost Accounts.
- B. After the Change Control Board member has concurred with the Change Request, OPM enters the Change Request into the Change Request Log

(Exhibit 27). Change Requests are numbered sequentially (scheme: FY - sequence #, e.g., 05-001) in order of receipt for tracking purposes. The Change Request Log is updated each time there is a change to the status of a Change Request. When the status of a Change Request is updated, OPM will notify all Associate Project Managers and Cost Account Managers connected with that WBS level and send a notice to each member of the project Change Control Board for informational purposes only. The affected Cost Account Manager will coordinate inputs to the Change Request form and draft a revised Cost Sheet and Cost Account Plan reflecting impacts due to the proposed change.

- D. At this stage in the process, the OPM Manager reviews the classification level assigned by the Cost Account Manager and, if he concurs, updates the Change Request Log. OPM also produces the Change Request Summary Report (Exhibit 28). For Class 1-2 and Class 3 Change Requests (see the next section for Class definitions), OPM distributes the Change Request to members of the Change Control Board. The Change Request is placed on the agenda for the next board meeting. The Change Request then enters the Review Phase of the Change Control process.

801.2 Review Phase

- A. The Review Phase is dictated by the Classification level of the Change Request. Changes are classified according to the extent that they impact the Project Baseline. The Classification and Approval Authority levels are determined by use of the criteria listed in Exhibit 29.
- B. Class 1-2 Change Request: This classification of Change Request requires the approval of the Project Customer. The Change Control Board evaluates the Change Request and provides a recommendation to the Project Director/Manager. The Project Director/Manager reviews the Change Request before forwarding to the customer for approval which may include a Baseline Change Control Board. After receiving the customer approval, the Project Director/Manager reviews the action directed by the customer. OPM updates the Change Request Log and the Change Request process enters into the Documentation Phase.
- C. Class 3 Change Request: This classification of Change Request requires the approval of the Project Director/Manager. The Change Control Board evaluates the Change Request and provides a recommendation to the Project Director/Manager. The Project Director/Manager approves the Change Request and OPM updates the Change Request Log. The Change Request process then enters into the Documentation Phase.

- D. Class 4 Change Request: This classification of Change Request requires the approval of the Associate Project Manager. Once OPM concurs with the Classification level, the Change Request goes to the Associate Project Manager for approval. After approval, OPM updates the Change Request Log and the Change Request process enters into the Documentation Phase.
- E. Class 5 Change Request: This classification of Change Request only requires the approval of the Cost Account Manager. Once OPM concurs with the Classification level, the Change Request goes to the Cost Account Manager for approval. After approval, OPM updates the Change Request Log and the Change Request process enters into the Documentation Phase.
- F. During the review process, any disapproved Change Request is sent back to the affected Cost Account Manager who will consult with the originator for determining any further action.

801.3 Documentation Phase

- A. The Documentation Phase is where the Project Baseline is revised and the approved change is implemented. Once the Change Request documents have been signed by the proper level of authority, OPM issues a Change Order. For changes to the project's technical design or scope, the Associate Project Manager is responsible for ensuring the relevant technical documentation is revised to reflect the change. OPM is responsible for revising cost/schedule baseline documents for changes impacting these project baselines.
- B. The Associate Project Manager also approves the revised Cost Account Plans. OPM reviews the Cost Account Plan and forwards them to the Project Director/Manager for review. The Project Director/Manager is the final approval authority for the revised Cost Account Plan. Once the Cost Account Plans are approved, OPM updates the Change Request Log and sends the Cost Account Plans to the appropriate Cost Account Manager for implementation.

802 Exhibits

- 26. Change Request Form
- 27. Change Request Log
- 28. Change Request Summary Report
- 29. Change Request Classifications



Exhibit 26. Change Request Form

Change Request Form

Project Name

Identification

Change Request # (OPM will fill in.)	Title	
WBS #	Date (m/d/yy)	Date Required (m/d/yy)
Originator Name		
Item Name		Drawing/Spec #
Vendor Name		Purchase Order #

Status

Change Request Status (Drop Down List) New

Description and Justification

Description of Proposed Change	
Justification of Proposed Change	
Change Control Board Member Concurrence	Impact Assessment Assigned To



Change Impact Assessment

Technical Impacts
Name(s)
Schedule Impacts
Name(s)
Cost Impacts
Name(s)
Quality/Safety Impacts
Name(s)

Classification Level

Classification (Drop Down List) Class 1	
Cost Account Manager	Associate Project Manager
OPM Approval	

Recommendation and Disposition

[illegible]

Change Control Board Review (if required)

CCB	Date (m/d/yy)
------------	----------------------

Final Approval

Class 5

Cost Account Manager	Date (m/d/yy)
-----------------------------	----------------------

Class 4

Associate Project Manager	Date (m/d/yy)
----------------------------------	----------------------

Class 3

Project Director/Manager	Date (m/d/yy)
---------------------------------	----------------------

Class 1-2

Project Customer	Date (m/d/yy)
-------------------------	----------------------

Continuation Page



**Instructions
for
Change Request Form**

(**Note:** Use the Continuation Page on last page of the Change Request form if more space is required. Label with section reference for any input to this page.)

Project Name: Self-explanatory.

Change Request #: This number will be filled in by OPM. The forms will be numbered consecutively as they are received and will be entered into the Change Request Log.

Title: A brief descriptive title.

WBS #: Work Breakdown Structure Number(s) affected by the change.

Date: Originator enters the date for the submission of the Change Request.

Date Required: Originator enters the estimated date approval is needed to avoid adverse impacts on technical performance, schedule, cost or quality/safety.

Originator Name: Name of individual submitting the Change Request.

Item Name: Enter name of item or procedure (component, subassembly, assembly, system, test, etc.) to be changed.

Drawing/ Spec #: The drawing/specification number(s) of the drawing/specification (s) affected by the change.

Vendor Name: If the item has been purchased, or a subcontract issued, enter the vendor's name(s) here.

Purchase Order #: If a purchase order(s) has been issued for the item, enter the number(s) here.

Change Request Status: This field in the Change Request form is a drop-down list (New / Open / Deferred / Duplicate / Approved / Disapproved). OPM will update the status of the Change Request as it progresses through the procedure.

Description of Proposed Change: Describe the change requested. Use the continuation page, as required.



Justification for Proposed Change: Justify the proposed change. Describe the problem or defect that will be corrected by the proposed change. Indicate the experience that dictates the need for the change. Summarize the capability to make the change. Use the continuation page, as required.

Change Control Board Member Concurrence: The Change Control Board member who concurs with the proposed change signs this block.

Impact Assessment Assigned To: The individual assigned to coordinate inputs to the Change Impact Assessment section of the Change Request is identified in this block.

Change Impact Assessment: Provide a statement of impact to technical performance, schedule, cost, quality/safety, and environment. Include the impact if the change is not approved. Use the continuation page, as required.

Name(s): Add the names of individual(s) who contributed and concurred to the pertinent assessment section.

Classification Level: The Classification field in the Change Request form is a drop-down list. Select Class 1, 2, 3, 4, or 5. The Cost Account Manager, Associate Project Manager, and OPM sign in the appropriate block.

Recommendation and Disposition: Recommendations and decisions concerning the Change Request are documented in this section. Use the continuation page, as required.

(Baseline) Change Control Board Review: The board chairman signs this block after review and recommendation by the board.

Final Approval: Based on the Change Request classification, OPM will select the appropriate signature blocks.

Exhibit 27. Change Request Log

[illegible]

Exhibit 28. Change Request Summary Report


 Change Request Summary Report (Project Name)							
Classification	New	Open	Deferred	Duplicate	Approved	Disapproved	Total
1-2							
3							
4							
5							
Total							
%							

Exhibit 29. Change Request Classifications

Classification*	Class 1-2	Class 3	Class 4	Class 5
Approval Authority	Project Customer Approval Required	Project Director/Manager Approval Required	Assoc Project Manager Approval Required	Cost Account Manager Approval Required
Technical Work Scope	Changes to work scope or performance requirements specified by the customer or included in the Mission Need approved by the customer	Changes to work scope or performance requirements that affect multiple APMs, but do not require customer approval	Changes to work scope or performance requirements that affect multiple CAMs, but do not affect other APMs	Changes to work scope or performance requirements that do not affect other CAMS
Schedule/ Milestones	Changes to Level 1-2 milestones that are under customer control	Changes to Level 3 milestones	Changes to Level 4 milestones	Changes to Level 5 milestones
Cost	Changes to the customer-approved Project Budget Base (TPC & TEC)	Changes that involve a transfer of work scope and its associated budget between APMs	Changes that affect multiple CAMs, do not affect other APMs	Changes that do not affect other CAMs

*** Unless superseded by the Project Execution Plan**

U. S. Department of Energy



Thomas Jefferson National Accelerator Facility

900 Glossary

900 Glossary

- **Actual Cost of Work Performed (ACWP)**
The direct costs incurred in accomplishing the project work activities, including labor, expenses, and procurement, plus indirect costs.
- **Actual Cost**
See ACWP.
- **Authorized Work**
Work effort that has been defined, funded, and for which written authorization has been received.
- **Baseline Milestones**
Top-level schedule events, deliverables and critical decision points of the project that signify completion of a planned effort.
- **Budget at Completion (BAC)**
The total authorized budget for accomplishing the work scope of a Cost Account, summary account, reporting element, or project.
- **Budgeted Cost of Work Performed (BCWP)**
The sum of the budgets for completed work activities and completed portions of open work activities, plus the applicable portion of the budgets for Level of Effort activities.
- **Budgeted Cost of Work Scheduled (BCWS)**
The sum of the budgets for all project work activities scheduled to be accomplished within a given time period.
- **Change Control**
The management process for requesting, reviewing, approving, and implementing changes to the project technical, schedule, or cost baselines.
- **Change Order**
An approved Change Request.
- **Change Request**
A form used to initiate a change to the Integrated Project Baseline.
- **Change Impact Assessment**
A section of the Change Request form used to document the technical, schedule, cost, and quality assurance/safety impacts of a proposed change.

- **Class 1-2 Change**
A change to a project baseline that affects elements reserved by the Project Customer for its change authority.
- **Class 3 Change**
A change to the Project Baseline approved by the Project Director/Manager that affects multiple Associate Project Managers, but does not require customer approval.
- **Class 4 Change**
A change to the Project Baseline approved by an Associate Project Manager that does not affect any factors relevant to Class 1-3 changes.
- **Class 5 Change**
A change to the Project Baseline approved by a Cost Account Manager that does not affect any factors relevant to Class 1-4 changes.
- **Change Control Board (CCB)**
A group of people who are responsible for evaluating and approving or disapproving proposed changes to the project baselines and for ensuring implementation of approved changes.
- **Chart of Accounts**
The list of all accounting elements for a particular project.
- **Contingency**
Reserve project funding held by the project customer for possible changes in project work scope and to cover potential cost overruns. Contingency is not associated with project work scope and is not part of the Performance Measurement Baseline. This may be held by the project customer.
- **Cost Account**
The lowest Work Breakdown Structure levels where organizational responsibility is assigned, cost estimates are developed, Cost Account plans are prepared, actual costs are accumulated, and earned value is assessed.
- **Cost Account Plan (CAP)**
The document that contains the detailed information for the Cost Account. Work activities are scheduled and the resources required to accomplish them are identified.
- **Cost Baseline**
The approved project budget as documented by the project Cost Book and supported by the Cost Account Plans.

- **Cost Book**
The official document detailing the project budget consisting of individual Cost Sheets and Summary Cost Sheets.
- **Cost Management System**
An Enterprise Suite software package where the project budget is managed. Linked with its counterpart, the Schedule Management System, to form an integrated cost/schedule database that is the heart of the Earned Value Management System.
- **Cost Sheet**
The Cost Account document that contains the cost obligation plan for labor, expense, and procurement resources summarized by fiscal year.
- **Cost Variance (CV)**
The Earned Value Management System metric for measuring the cost performance on the project. It is the difference between BCWP and ACWP, and can be calculated at all WBS levels (Cost Account level to project level).
- **Cost Performance Index (CPI)**
An efficiency measurement defined by the work accomplished for the resources expended. Calculated by dividing BCWP by ACWP for a given time period.
- **Critical Path**
The series of project activities that must be finished per the schedule plan in order for the entire project to finish on schedule. It represents the activity path with the longest duration and all activities on the critical path are critical activities.
- **Detail Milestones**
A tertiary level of project milestones established after the Intermediate Milestones have been determined providing greater detail to the project schedule.
- **Detail Schedule**
The final phase of project schedule development with all milestones (Baseline, Intermediate, and Detail) and activities defined and appropriately linked.
- **Direct Costs**
Any costs (labor, expenses, procurement) that may be identified specifically with a particular project activity.
- **Earned Value**
See BCWP.

- **Earned Value Management System (EVMS)**
An integrated management process where all work is planned, budgeted, and scheduled in time-phased increments resulting in a cost and schedule baseline against which project performance is measured.
- **Estimate at Completion (EAC)**
Actual project costs to date plus the forecast of costs to complete unfinished work.
- **Estimate to Complete (ETC)**
The current estimated cost to accomplish the remaining project work scope.
- **Indirect Costs**
Costs not identifiable to a specific project or work element, but are shared among an organization's units. Usually includes supervisory and administrative labor, and expendable type materials.
- **Integrated Project Baseline**
The validated and approved project plan consisting of the technical baseline, the cost baseline, and the schedule baseline.
- **Intermediate Milestones**
A secondary level of project milestones established after the Baseline Milestones have been determined providing more detail to the project schedule.
- **Level of Effort (LOE)**
A sustained level of effort on a project that is general or supportive in nature and does not produce a definite end product. Examples include supervision, project management and administration activities.
- **Management Reserve (MR)**
An amount of the total project budget set aside for project management control purposes rather than being allocated for the accomplishment of specific activities. MR is not associated with project work scope and is not part of the Performance Measurement Baseline.
- **Organizational Breakdown Structure (OBS)**
The functional depiction of the project organization indicating the hierarchical relationships of the organizational elements and designating the project work responsibilities when integrated with the Work Breakdown Structure.
- **Percent Complete**
For an activity or group of activities, a ratio, expressed as a percentage, of the amount of work that has been completed to the total planned work.

- **Performance Measurement Baseline (PMB)**
The approved time-phased budget plan for accomplishing scheduled project activities as documented in the Cost Account Plans and maintained in the integrated cost/schedule database. Contingency and Management Reserve are not included in the Performance Measurement Baseline.
- **Planned Value**
See BCWS.
- **Project-Organization-Account (POA) Number**
An accounting numbering system established for the accumulation and collection of project costs.
- **Responsibility Assignment Tree**
A summary of the project WBS elements and the management elements of the project team that identifies work effort with the organizational entity responsible for its accomplishment.
- **Schedule Baseline**
The validated and approved dates for starting and completing project work activities and achieving the project Baseline, Intermediate, and Detail Milestones.
- **Schedule Management System**
An Enterprise Suite software package where the project schedule is managed. Linked with its counterpart, the Cost Management System, to form an integrated cost/schedule database that is the heart of the Earned Value Management System.
- **Schedule Variance**
The Earned Value Management System metric for measuring the schedule performance on the project. It is the difference between BCWP and BCWS, and can be calculated at all WBS levels (Cost Account level to project level).
- **Schedule Performance Index (SPI)**
An efficiency measurement defined by the work performed compared to the work that was planned to be accomplished. Calculated by dividing BCWP by BCWS for a given time period.
- **Technical Baseline**
Organized by the approved Work Breakdown Structure, the performance criteria and design specifications for systems and components as described in the project's technical documentation.
- **Undistributed Budget (UB)**
Project budget that has not yet been allocated to specific Cost Accounts.

- **Variance at Completion (VAC)**
The difference between the Budget at Completion and the Estimate at Completion. It represents the amount of expected project cost overrun or underrun, before the allocation of Management Reserve or Contingency.
- **Variance Analysis**
The analytical examination of Cost Variances, Schedule Variances, and At Complete Variances to determine the cause for the variance, any impact the variance may have, and any corrective action necessary to meet project objectives.
- **Variance Threshold**
Established by the Project Customer and Project Director/Manager, the cost and schedule variance criteria that will require the generation of a formal Variance Analysis Report.
- **Work Activity**
A discrete effort that describes the work to be accomplished, the schedule of expenditures and use of resources, and that serves as a vehicle for monitoring and reporting progress.
- **Work Authorization**
The process of sanctioning specified project work to be performed during a specified time period. Implemented through the Work Authorization Form.
- **Work Breakdown Structure (WBS)**
The hierarchical framework that defines the technical work scope of the project and is the basis for project management, cost estimating, scheduling, project cost/schedule control and performance measurement.
- **Working Detail Schedule**
A working tool of the Schedule Management System for evaluating project schedule plans and forecasting future progress.

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Thomas Jefferson National Accelerator Facility

**1000
EVMS Guidelines
Compliance**

1000 Earned Value Management System Guidelines Compliance

This chapter of the Project Control System Manual identifies the chapters and sections that address the 32 Earned Value Management System guidelines established in the ANSI/EIA Standard-748-A-1998.

1001 Organization

- A. Define the authorized work elements for the program. A work breakdown structure, tailored for effective internal management control, is commonly used in this process.
 - 202 Work Breakdown Structure
- B. Identify the program organizational structure, including the major subcontractors responsible for accomplishing the authorized work, and define the organizational elements in which work will be planned and controlled.
 - 203 Project Organization
- C. Provide for the integration of the company's planning, scheduling, budgeting, work authorization and cost accumulation processes with each other, and as appropriate, the program work breakdown structure and the program organizational structure.
 - 300 Scheduling and Budgeting
 - 400 Work Authorization
 - 500 Accounting
 - 204 WBS and Project Organization Integration
 - 205 Responsibility Assignment Tree
- D. Identify the company organization or function responsible for controlling overhead (indirect costs).
 - 501.9 Indirect Costs
- E. Provide for integration of the program work breakdown structure and the program organizational structure in a manner that permits cost and schedule performance measurement by elements of either or both structures as needed.
 - 204 WBS and Project Organization Integration
 - 701 Variance Analysis

1002 Planning, Scheduling and Budgeting

- A. Schedule the authorized work in a manner which describes the sequence of work and identifies significant task interdependencies required to meet the requirements of the program.
 - 301 Schedule Planning
 - PCS-01 Schedule Planning Procedure
- B. Identify physical products, milestones, technical performance goals, or other indicators that will be used to measure progress.
 - 301.2 Schedule Development
- C. Establish and maintain a time-phased budget baseline, at the control account level, against which program performance can be measured. Budget for far-term efforts may be held in higher level accounts until an appropriate time for allocation at the control account level. Initial budgets established for performance measurement will be based on either internal management goals or the external customer negotiated target cost, including estimates for authorized but undefinitized work. On government contracts, if an over-target baseline is used for performance measurement reporting purposes, prior notification must be provided to the customer.
 - 303 Integrated Project Baseline
 - 303.1 Performance Measurement Baseline
- D. Establish budgets for authorized work with identification of significant cost elements (labor, material, etc.) as needed for internal management and for control of subcontractors.
 - 302 Cost Planning
 - PCS-02 Cost Planning Procedure
- E. To the extent it is practical to identify the authorized work in discrete work packages, establish budgets for this work in terms of dollars, hours, or other measurable units. Where the entire control account is not subdivided into work packages, identify the far term effort in larger planning packages for budget and scheduling purposes.
 - 302.4 Cost Estimate Development
- F. Provide that the sum of all work package budgets plus planning package budgets within a control account equals the control account budget.
 - 302.4 Cost Estimate Development

- G. Identify and control level of effort activity by time-phased budgets established for this purpose. Only that effort which is unmeasurable or for which measurement is impractical may be classified as level of effort.
 - 601.2 Earned Value
- H. Establish overhead budgets for each significant organizational component of the company for expenses which will become indirect costs. Reflect in the program budgets, at the appropriate level, the amounts in overhead pools that are planned to be allocated to the program as indirect costs.
 - 501.9 Indirect Costs
- I. Identify management reserves and undistributed budget.
 - 302.3 Funding Guidance
 - 302.4 Cost Estimate Development
 - 303.1 Performance Measurement Baseline
- J. Provide that the program target cost goal is reconciled with the sum of all internal program budgets and management reserves.
 - 302.4 Cost Estimate Development
 - 303.1 Performance Measurement Baseline

1003 Accounting Considerations

- A. Record direct costs in a manner consistent with the budgets in a formal system controlled by the general books of account.
 - 501 Cost Collection and Control
- B. When a work breakdown structure is used, summarize direct costs from control accounts into the work breakdown structure without allocation of a single control account to two or more work breakdown structure elements.
 - 501.6 Cost Reporting
- C. Summarize direct costs from the control accounts into the contractor's organizational elements without allocation of a single control account to two or more organizational elements.
 - 501.6 Cost Reporting

- D. Record all indirect costs which will be allocated to the contract.
 - 501.9 Indirect Costs
- E. Identify unit costs, equivalent unit costs, or lot costs when needed.
 - 501.2 Accounts Payable via Purchase Order (PO) Voucher
 - 501.6 Cost Reporting
- F. For EVMS, the material accounting system will provide for:
 - accurate cost accumulation and assignment of costs to control accounts in a manner consistent with the budgets using recognized, acceptable, costing techniques;
 - cost performance measurement at the point in time most suitable for the category of material involved, but no earlier than the time of progress payments or actual receipt of material; and
 - full accountability of all material purchased for the program including the residual inventory.
 - 502 Material Accounting System

1004 Analysis and Management Reports

- A. At least on a monthly basis, generate the following information at the control account and other levels as necessary for management control using actual cost data from, or reconcilable with, the accounting system.
 - Comparison of the amount of planned budget and the amount of budget earned for work accomplished. This comparison provides the schedule variance.
 - Comparison of the amount of the budget earned and the actual (applied where appropriate) direct costs for the same work. This comparison provides the cost variance.
 - 702.2 Schedule and Cost Management Systems Reports
 - PCS-03 Performance Reporting Procedure
- B. Identify, at least monthly, the significant differences between both planned and actual schedule performance and planned and actual cost performance, and provide the reasons for the variances in the detail needed by program management.
 - 702.2 Schedule and Cost Management Systems Reports
 - PCS-03 Performance Reporting Procedure

- C. Identify budgeted and applied (or actual) indirect costs at the level and frequency needed by management for effective control, along with the reasons for any significant variances.
 - 702.1 Financial Management System Reports
- D. Summarize the data elements and associated variances through the program organization and/or work breakdown structure to support management needs and any customer reporting specified in the contract.
 - 702.2 Schedule and Cost Management Systems Reports
 - PCS-03 Performance Reporting Procedure
- E. Implement managerial actions taken as the result of earned value information.
 - 700 Analysis and Reporting
 - 703 Meetings and Reviews
- F. Develop revised estimates of cost at completion based on performance to date, commitment values for material, and estimates of future conditions. Compare this information with the performance measurement baseline to identify variances at completion important to company management and any applicable customer reporting requirements including statements of funding requirements.
 - 701.2 Estimate at Completion
 - 702 Project Reports

1005 Revisions and Data Management

- A. Incorporate authorized changes in a timely manner, recording the effects of such changes in budgets and schedules. In the directed effort prior to negotiation of a change, base such revisions on the amount estimated and budgeted to the program organizations.
 - 801 Change Control Process
 - PCS-04 Change Control Procedure
- B. Reconcile current budgets to prior budgets in terms of changes to the authorized work and internal replanning in the detail needed by management for effective control.
 - 801 Change Control Process

- C. Control retroactive changes to records pertaining to work performed that would change previously reported amounts for actual costs, earned value, or budgets. Adjustments should be made only for correction of errors, routine accounting adjustments, effects of customer or management directed changes, or to improve the baseline integrity and accuracy of performance measurement data.
 - 801 Change Control Process
- D. Prevent revisions to the program budget except for authorized changes.
 - 801 Change Control Process
- E. Document changes to the performance measurement baseline.
 - 801.3 Documentation Phase

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Thomas Jefferson National Accelerator Facility

1100 System Surveillance

1100 EVMS Surveillance

A. The Project Control System Manual defines the processes and procedures for implementing an Earned Value Management System on projects conducted at the Jefferson Lab. Once an Earned Value Management System has been implemented, it is essential that an ongoing surveillance process be initiated to evaluate the effectiveness of this management tool in communicating to project management a project's cost, schedule, and technical performance. The Office of Project Management is responsible for conducting the Earned Value Management System surveillance program at Jefferson Lab. Results from this assessment are used by the Office of Project Management and on-site project management teams to make process corrections and improvements where needed. The Earned Value Management System surveillance accomplishes two goals: First, it determines if the processes and procedures described in the Project Control System Manual are working as intended; second, it ascertains whether these processes and procedures continue to comply with the guidelines set forth in the American National Standards Institute/Electronic Industry Alliance (ANSI/EIA) 748-A Standard for Earned Value Management Systems. The focus of the surveillance process is on insight into the Earned Value Management System for Jefferson Lab projects. Its use is to identify problem areas with the implementation of the Project Control System Manual and not as a project audit. Solutions to any issues are proposed and action is taken. With regular surveillance reviews, the Lab's process for the Earned Value Management System will provide the following benefits:

- Project performance information will depict actual conditions and trends.
 - Earned Value Management data will be timely, accurate, and reliable.
 - Actual or potential problems will be indicated soon enough for corrective action.
 - Integrity of the Project Baseline will be maintained.
- B. The Office of Project Management will ensure that an annual surveillance review of its Earned Value Management System is conducted. A list of all potential candidate projects to be surveyed and one or two of them will be selected for review. The procedures for this review are as follows:
- A small team will be established to accomplish the review. The members of the team will be acquainted with the Earned Value Management process as described in the Project Control System Manual.

- A surveillance plan will be produced that will describe the approach of the review including the responsibilities, the evaluation methods, and the schedule.
- The surveillance team will conduct interviews of selected Cost Account Managers and other project management leaders, as appropriate. The main focus of the interviews is to gain an understanding of how the Project Control System Manual is being used and how the 32 ANSI-748 Earned Value Management guidelines are implemented on the selected project.
- For each reviewed project, a list of findings will be generated from the results of the interviews and a corrective action plan established. Action to resolve identified problems may be required for the project itself and/or the Project Control System Manual.
- When the surveillance reviews have been completed, the results are documented in a surveillance database. The overall health of the Lab's Earned Value Management System can be tracked using this data and systemic problems across multiple projects identified. With these results, system training can be updated and process improvements can be initiated. Lessons learned from the surveillance reviews will be shared with all project teams.

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1200 Project Control System Procedures



Project Control System Procedure PCS-01 Schedule Planning



PCS-01 Schedule Planning Procedure

CONTENTS

1.0 General

2.0 Procedures

3.0 Process Flow Diagrams

3.1 Schedule Baseline Development Flow Diagram

Procedure PCS-01 Schedule Planning Procedure

1.0 General

This document defines the procedures and responsibilities for developing a project baseline schedule. In cooperation with the customer, all levels of project management are involved in the process of establishing a timetable of milestones and activities that will lead to a successful project outcome.

2.0 Procedures

The following Schedule Planning procedures are graphically displayed in Diagram 3.1.

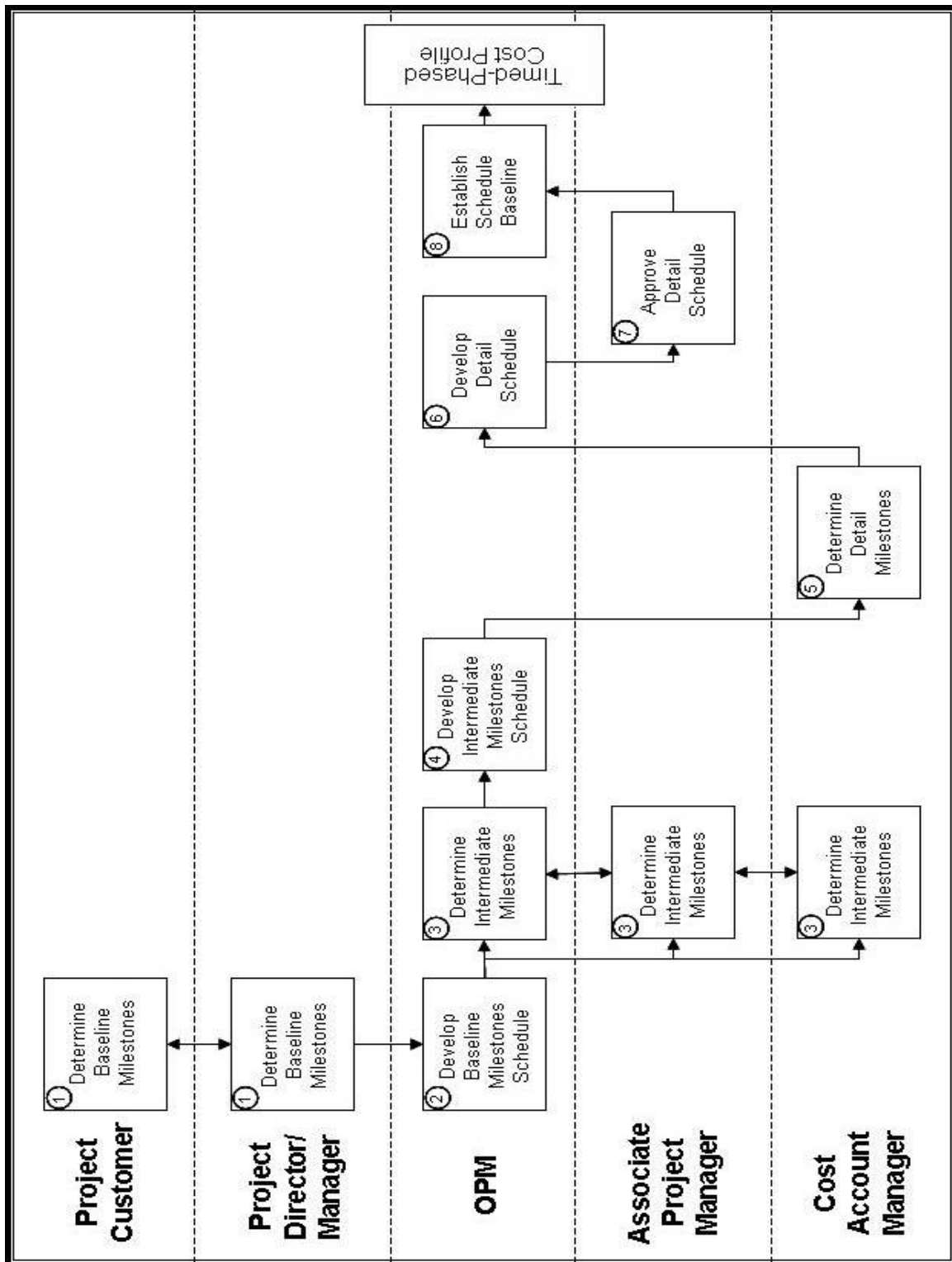
- 1 - The Project Customer and the Project Director jointly determine the Baseline Milestones.
The Project Director, collaborating with the Project Customer, jointly select the project key events and decision points that constitute the master schedule. Titles, definitions and planned dates are determined for each Baseline Milestone.
- 2 - The Office of Project Management (OPM) develops the Baseline Milestones Schedule.
OPM loads the Baseline Milestones with their associated planned dates into the Schedule Management System forming a Baseline Milestones Schedule.
- 3 - The Office of Project Management, the Associate Project Manager, and the Control Account Manager identify the Intermediate Milestones.
Based on the defined Baseline Milestones, OPM, the Associate Project Manager(s), and the Control Account Manager(s) identify the important level 3 and 4 milestones of the project.
- 4 - The Office of Project Management develops the Intermediate Milestone Schedule.
OPM loads the Intermediate Milestones with their associated planned dates into the Schedule Management System forming an Intermediate Milestones Schedule.

- 5 - The Cost Account Managers develop the Detail Milestones.
Appropriate Detail Milestones are identified by the Cost Account Managers for their Cost Accounts.
- 6 - The Office of Project Management develops the Detail Schedule.
With the schedule data from the Cost Account Plans, OPM develops the project's Detail Schedule. Start dates, duration, preceding activities, and succeeding activities are entered for each activity. Resources and budgets allocated to the Cost Account Plan activities are also integrated into the Detail Schedule.
- 7 - The Associate Project Manager approves the Detail Schedule.
After OPM integrates the information from the Cost Account Plans into the Detail Schedule, the Associate Project Manager reviews and approves the Detail Schedule.
- 8 - The Office of Project Management establishes the Schedule Baseline.
After the Detail Schedule has been approved, this schedule becomes the Schedule Baseline. With the resources and budgets identified in the Cost Baseline integrated with the activity schedule in the Schedule Baseline, the project's Time-Phased Cost Profile is established. OPM also generates the Working Detail Schedule.

3.0 Process Flow Diagrams

3.1 Schedule Baseline Development Flow Diagram

3.1 Schedule Baseline Development Flow Diagram





Project Control System Procedure PCS-02 Cost Planning



**Procedure PCS-02
Cost Planning Procedure**

CONTENTS

1.0 General

2.0 Procedures

3.0 Process Flow Diagrams

3.1 Cost Baseline Development Flow Diagram

Procedure PCS-02 Cost Planning Procedure

1.0 General

This document defines the procedures and responsibilities for developing a project cost baseline. With funding guidance from the customer, all levels of project management are involved in the process of producing a cost estimate for the project. When combined with the project schedule, a timed-phase budget will be established against which project performance can be measured.

2.0 Procedures

The following Cost Planning procedures are graphically displayed in Diagram 3.1.

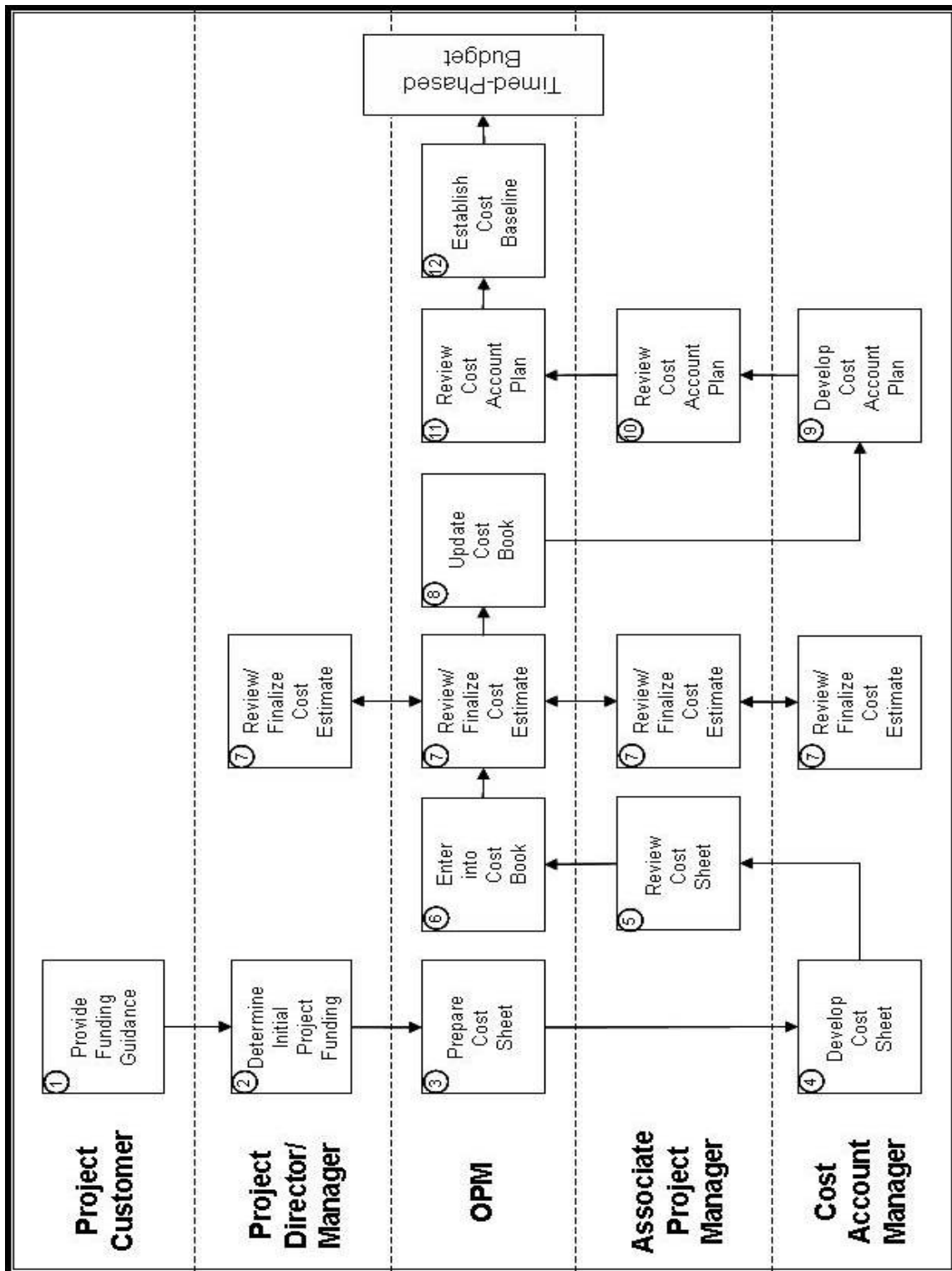
- 1 - The Project Customer provides funding guidance.
Based on the desired final product and the expected funding availability, the Project Customer will usually provide the Project Director an overall budget for the project.
- 2 - The Project Director/Manager determines an initial project funding profile.
Taking the funding guidance provided by the Project Customer, the Project Director/Manager establishes an initial funding profile for the project. With a preliminary WBS framework, proposed budgets may be prescribed as well as a fiscal year breakout.
- 3 - The Office of Project Management prepares the initial Cost Sheet.
For each Cost Account, the OPM prepares the Cost Sheet forms that will be used by the Cost Account Managers in developing the cost estimates for their portion of the project.
- 4 - The Cost Account Manager develops the Cost Sheet.
The Cost Account Manager develops a Cost Sheet for each Cost Account showing the dollars expected to be committed by fiscal year. Overhead rates and escalation factors are applied to dollar figures in the Cost Sheet from information supplied by the Chief Financial Office.
- 5 - The Associate Project Manager reviews the Cost Sheet.
The Associate Project Manager reviews the Cost Sheets within his area of responsibility. Sheets that are not complete are returned to the appropriate Cost Account Manager for revision. Once satisfactory, the Cost Sheet is forwarded to the Office of Project Management.

- 6 - The Office of Project Management enters the Cost Sheet into the Cost Book.
OPM reviews the Cost Sheet to ensure that the cost estimate as reported on the Cost Sheet does not exceed any pre-established funding constraints.
The Cost Sheet is incorporated into the project Cost Book.
- 7 - Project Management reviews and finalizes the cost estimate.
All levels of Project Management (Project Director/Manager, Office of Project Management, Associate Project Manager, Cost Account Manager) review the consolidated cost estimate for the project, and through negotiation, finalize the estimate. The Cost Account Manager revises the Cost Sheets and Cost Account Plan for each relevant Cost Account based on the final negotiated cost estimate for the project.
- 8 - The Office of Project Management updates the Cost Book.
Once all cost estimates have been finalized, OPM incorporates the updated Cost Sheets into the Cost Book.
- 9 - The Cost Account Manager develops the Cost Account Plan.
The Cost Account Manager develops a Cost Account Plan based in the data incorporated into the Cost Sheet. The Cost Account Plan provides a detailed schedule, resource and budget plan.
- 10 - The Associate Project Manager reviews the Cost Account Plan.
The Associate Project Manager reviews the Cost Account Plans within his area of responsibility. Plans that are not complete are returned to the appropriate Cost Account Manager for revision. Once satisfactory, the Cost Account Plan is forwarded to the Office of Project Management.
- 11 - The Office of Project Management reviews the Cost Account Plan.
OPM reviews the Cost Account Plan and ensures the information in the plan matches the Cost Sheet data in the Cost Book.
- 12 - The Office of Project Management establishes the Cost Baseline.
With an approved Cost Book, this document establishes the Cost Baseline of the project. This cost is then integrated with the Baseline Detail Schedule to produce the project's Time-Phased Budget.

3.0 Process Flow Diagrams

3.1 Cost Baseline Development Flow Diagram

3.1 Cost Baseline Development Flow Diagram





Project Control System
Procedure
PCS-03
Performance Reporting



**Procedure PCS-03
Performance Reporting Procedure**

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1.0 General

2.0 Procedures

3.0 Process Flow Diagrams

3.1 Performance Reporting Flow Diagram

Procedure PCS-03 Performance Reporting Procedure

1.0 General

This document defines the procedures and responsibilities for collecting and reporting cost and schedule performance data and analyzing these data to assess current and projected future project status. Cost and schedule performance is measured and reported for each Cost Account, WBS element, and organization element.

2.0 Procedures

The following Performance Reporting procedures are graphically displayed in Diagram 3.1.

- 1 - The Project Director/Manager determines the variance thresholds.
The Project Director/Manager determines the thresholds used to flag variances for each reporting element of the WBS and organization structure.
- 2 - The Cost Account Manager prepares the Status Update Report.
At the end of the accounting period, the Cost Account Manager reports the Cost Account work progress and accomplishments by providing input on the Status Update Report.
- 3 - The Associate Project Manager reviews the Status Update Report.
The Associate Project Manager verifies work package completions and makes assessment of interim progress.
- 4 - The Office of Project Management determines the Budgeted Cost of Work Performed.
Using the Status Update Reports, the Office of Project Management (OPM) calculates BCWP (Earned Value) by summing the budgets of work accomplished and completed portions of work in progress for each Cost Account. Progress is usually measured as Percentage Complete or Level of Effort.
- 5 - The performing organizations report expenses incurred.
Performing organizations charge actual costs incurred throughout the reporting period using the accounting system.

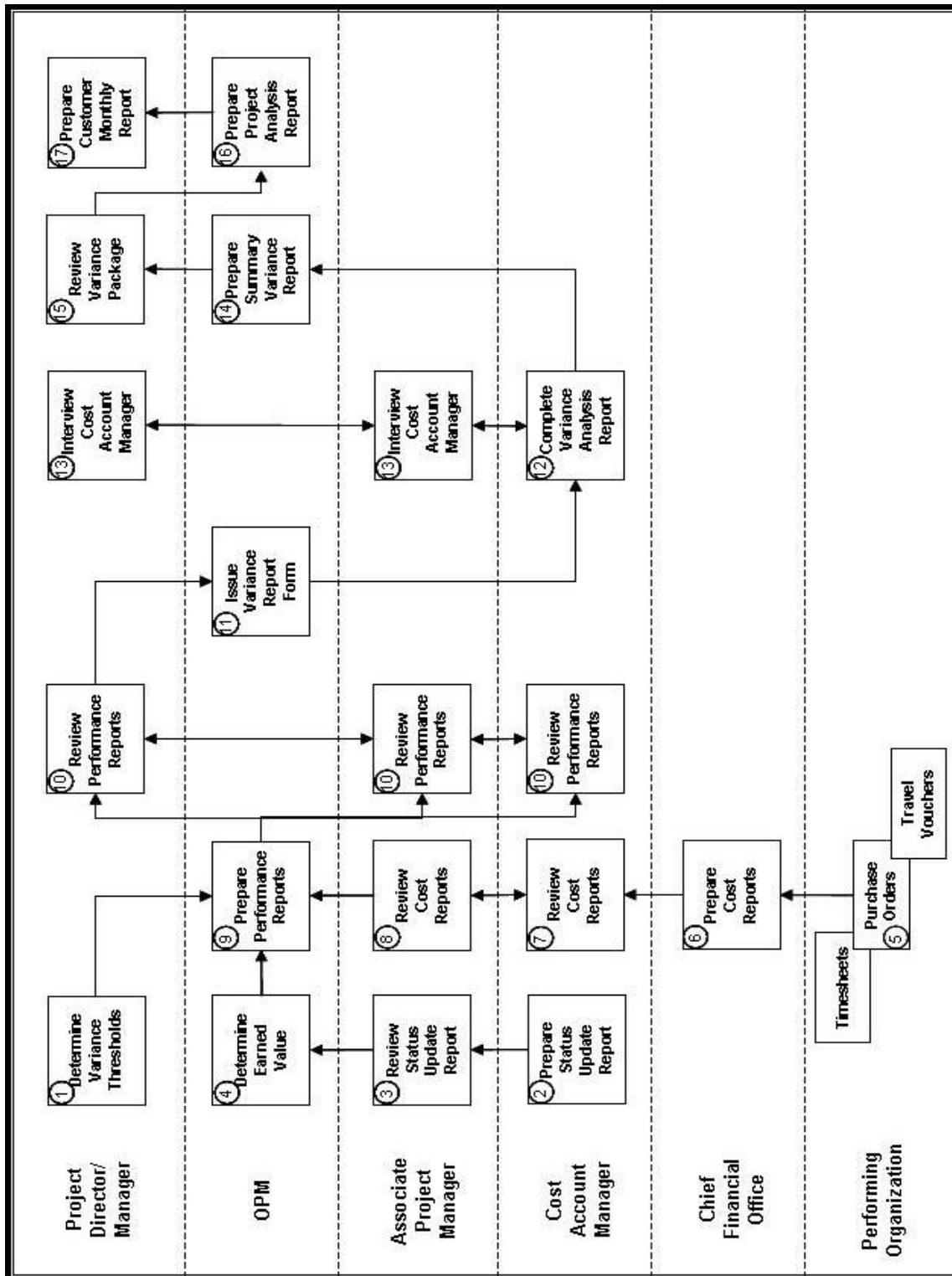
- 6 - The Chief Financial Office prepares the cost reports.
The Chief Financial Office converts time sheets, purchase orders, receipts and invoices, travel expense vouchers, and other entry documents into costs and commitments for each Cost Account. Labor and cost reports are prepared by the Chief Financial Office and are available to the Cost Account Managers and Associate Project Managers for review and to OPM for entering into the performance database.
- 7 - The Cost Account Manager reviews the cost reports.
The Cost Account Managers reviews the cost reports for accuracy and control of costs. Unusual or excessive charges are investigated and errors are reported to the Chief Financial Office.
- 8 - The Associate Project Manager reviews the cost reports.
Each Associate Project Manager reviews actual costs with the Cost Account Manager directing the effort.
- 9 - The Office of Project Management prepares the performance reports.
OPM combines ACWP (Actual Costs) data from Accounting, BCWS (Planned Value), and Budget At Completion from the Performance Measurement Baseline, BCWP (Earned Value) as determined in step 4 above, and Estimate At Completion to calculate cost, schedule, and at-completion variances. Results are published in monthly performance reports (Project Analysis Reports). Attached to the Project Analysis Report is the Red Flag Report where significant variances are flagged in accordance with the thresholds established by the Project Director/Manager.
- 10 - Project Management reviews the performance reports.
Each Cost Account Manager reviews the Cost Account Performance Report, notes variances, and determines reasons for above or below planned performance. Each Associate Project Manager reviews the Cost Account Performance Reports and the technical progress for their area of responsibility and discusses the work, cost, and schedule status with the responsible Cost Account Manager. The Project Director/Manager reviews the Project Analysis Report and Red Flag Report and identifies reporting elements of the WBS for which formal Variance Analysis Reports are required.
- 11 - The Office of Project Management issues the Variance Analysis Report form.
OPM issues a Variance Analysis Report form for each reporting element requiring a Variance Analysis Report.

- 12 - The Cost Account Manager completes the Variance Analysis Report.
The Cost Account Manager conducts a variance analysis to include the reasons for the variances, the anticipated effect on the project cost, schedule or technical parameters, and proposed corrective action.
- 13 - The Project Director/Manager interviews the Cost Account Managers and Associate Project Managers.
Project Manager interviews the Cost Account Managers and Associate Project Managers from whom Variance Analysis Reports are required. The Variance Analysis Reports are revised based on the discussion. The Variance Analysis Report form is signed by the Cost Account Manager and the Project Director/Manager.
- 14 - The Office of Project Management prepares the Summary Variance Analysis Report.
OPM collects the Variance Analysis Reports, confirms that requested variances have been addressed, and prepares a Summary Variance Analysis Report for the project. OPM forwards the variance package, including the revised Estimates At Completion, to the Project Director/Manager.
- 15 - The Project Director/Manager reviews the variance package.
The Project Director/Manager reviews the variance package consisting of the Summary Variance Analysis Report and detailed Variance Analysis Reports, including new Estimates At Completion. The Project Director/Manager may revise the Cost Accounts, including Estimates At Completion, to reflect overall knowledge of the project and responsibility and prerogative to exercise cost, schedule and technical trade-off decisions relative to the total project via the Change Control process.
- 16 - The Office of Project Management prepares the revised Project Analysis Report.
OPM prepares the revised Project Analysis Report including the summary variance analysis for delivery to the Project Director/Manager.
- 17 - The Project Director/Manager prepares the monthly report.
The Project Director/Manager reviews the Project Analysis Report and the summary variance analysis, and prepares the monthly report to the Project Customer.

3.0 Process Flow Diagrams

3.1 Performance Reporting Flow Diagram

3.1 Performance Reporting Flow Diagram





Project Control System Procedure PCS-04 Change Control



**Procedure PCS-04
Change Control Procedure**

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1.0 General

2.0 Procedures

2.1 Request Phase

2.2 Review Phase

2.3 Documentation Phase

3.0 Process Flow Diagrams

3.1 Request Phase Flow Diagram

3.2 Review Phase Flow Diagrams

- **External Approval**
- **Internal Approval**

3.3 Documentation Phase Flow Diagram

Procedure PCS-04 Change Control Procedure

1.0 General

The Project Baseline is the approved technical, schedule and cost plan for accomplishing all project activities. As the project progresses, this baseline may change due to Project Customer redirection, internal replanning, or redesign. Changes are classified according to the extent that they impact the Project Baseline. The review process and the approval authority required for a proposed change depend upon its classification. This document defines the procedures and responsibilities for requesting, reviewing, and documenting changes to the Project Baseline, and to assure timely implementation of changes once they are approved.

2.0 Procedures

The following procedures for requesting, reviewing and documenting change requests are keyed to the Change Control process flow diagrams (Section 3.0).

2.1 Request Phase (See Diagram 3.1)

Any project team member may request a change to the technical, schedule, and cost baselines by generating a Change Request form and submitting it to a member of the Change Control Board for concurrence.

- 1 - Originator prepares the Change Request.
The originator prepares the Change Request form in accordance with the document instructions.
- 2 - Change Control Board member concurs with the Change Request.
The originator must then obtain the concurrence of one member of the Change Control Board in order for the request to be accepted for consideration. The concurring member signs the Change Request in the 'Concurrence' block.
- 3 - Change Control Board initiates the Change Impact Assessment process.
If the Change Impact Assessment has not been completed on the Change Request form, the Change Control Board assigns actions for analyses of potential technical, schedule, and cost effects of the proposed change. Primary responsibility is typically assigned to a Cost Account Manager. The Change Control Board also reviews Change Impact Assessment submittals and may assign additional action as required. Due dates are assigned for action requests.

- 4 - OPM enters the Change Request in the Change Request Log.
After concurrence is obtained, OPM assigns a number (scheme: FY - sequence #, e.g., 05-001) to the Change Request and enters it in the Change Request Log as “New.” OPM maintains this log as a database, updating information each time there is a change to the status of a Change Request. For Class 1-2 and Class 3 changes, OPM distributes the Change Request to members of the Change Control Board, and places the Change Request on the agenda for the next Change Control Board meeting.
- 5 - Cost Account Manager coordinates inputs to the Change Impact Assessment.
The assigned Cost Account Manager completes the Change Impact Assessment. The Change Impact Assessment records the potential impacts of the proposed change to the technical, schedule and cost baselines and also to safety and quality. The impacts of not approving the change are also documented. The Cost Account Manager coordinates inputs from relevant parties, such as scientists, engineers, contractors, and quality and safety personnel, to document these potential impacts. Continuation pages are attached to the Change request form where space is insufficient. Where drawings, specifications, purchase orders, Cost Sheets, Cost Account Plans, etc., are affected, changes are marked on copies and attached.
- 6 - Cost Account Manager drafts a change to the Cost Sheet.
The Cost Account Manager indicates Cost Sheet revisions resulting from the proposed change by marking copies of the affected Cost Sheet and attaching them to the Change Request. The Cost Sheet and other exhibits remain a part of the Change Request package during the remainder of the internal review process.
- 7 - Cost Account Manager establishes the classification of the Change Request.
After reviewing the Change Impact Assessment and exhibits, the Cost Account Manager establishes the Change Request classification. The Cost Account Manager selects the appropriate class and signs the appropriate block on the Change Request form.
- 8 - Associate Project Manager concurs with the classification of the Change Request.
The Associate Project Manager reviews the classification assigned by the Cost Account Manager and, if he concurs, signs the adjacent block.
- 9 - The Office of Project Management approves the classification of the Change Request.
The OPM Manager reviews the classification assigned by the Cost Account Manager and, if he concurs, signs the next block on the Change

Request form. The classification may also be reviewed and changed by the Change Control Board.

2.2 Review Phase (See Diagram 3.2)

After the Change Request has been generated, impacts have been assessed, and an approved classification level has been established, it enters the Review Phase where the proposed change is evaluated and approved by an appropriate authority. For Class 1-2 Change Requests that will go to the Project Customer, this will be an external approval process. Class 3-5 Change Requests follow an internal process.

- **External Approval**

10 - The Office of Project Management updates the Change Request Log.

Once OPM has approved the classification level, the Change Request enters the Review Phase. The status of the Change Request is updated in the Change Request Log to "Open." OPM monitors the status of Change Requests awaiting action.

11 - Change Control Board evaluates the Class 1-2 Change Request.

For Class 1-2 Change Requests, OPM distributes the Change Request to members of the Change Control Board and places the Change Request on the agenda for the next board meeting. OPM also produces the Change Request Status Report. The Change Control Board evaluates the Class 1-2 Change Request package and recommends action to the Project Director/Manager.

12 - Project Director/Manager reviews the Class 1-2 Change Request.

The Project Director/Manager reviews the Class 1-2 Change Request package and Change Control Board recommendations. The Project Director/Manager prepares a submission to the Project Customer in accordance with customer procedures which may include a Baseline Change Control Board. This may include the Change Request as received, with some or all of the exhibits, or it may be a letter extracted from the Change Request material with additional amplification where necessary.

13 - Project Customer approves/disapproves the Class 1-2 Change Request.

For Class 1-2 Change Requests, the Project Customer is the final approving authority. Approval is indicated by signature in the appropriate 'Final Approval' block on the Change Request form. The approved Class 1-2 Change Request package is then returned to the Project Director/Manager.

- 14 - Project Director/Manager reviews the Project Customer Change Request actions.

The Project Director/Manager reviews the decisions of the Project Customer and documents any impacts to the project plans in the Recommendation and Disposition section of the Change Request.

- 15 - The Office of Project Management determines the approval status of the Change Request.

OPM updates the Change Request Log after the review process has been completed. At this stage, the Change Request can be deferred, approved, disapproved or determined to be a duplicate of a previously submitted Change Request. Any disapproved CR is sent back to the affected CAM who will consult with the originator to determine any further action.

- **Internal Approval**

- 10 - The Office of Project Management updates the Change Request Log.

Once OPM has approved the classification level, the Change Request enters the Review Phase. The status of the Change Request is updated in the Change Request Log to "Open." OPM monitors the status of Change Requests awaiting action.

- 11 - Change Control Board evaluates the Class 3 Change Request.

For Class 3 Change Requests, OPM distributes the Change Request to members of the Change Control Board and places the Change Request on the agenda for the next board meeting. OPM also produces the Change Request Status Report. The Change Control Board evaluates the Class 3 Change Request package and recommends action to the Project Director/Manager.

- 12 - Project Director/Manager reviews the Class 3 Change Request.

The Project Director/Manager reviews the Class 3 Change Request package and Change Control Board recommendations.

- 13 - Project Director/Manager approves/disapproves the Class 3 Change Requests.

For Class 3 Change Requests, the Project Director/Manager is the final approving authority. Approval is indicated by signature in the appropriate 'Final Approval' block on the Change Request form. The approved Class 3 Change Request package is forwarded to OPM.

- 14 - Associate Project Manager evaluates the Class 4 Change Request.

The Associate Project Manager evaluates Class 4 Change Requests.

- 15 - Associate Project Manager approves/disapproves the Class 4 Change Request.
For Class 4 Change Requests, the Associate Project Manager is the final approving authority. Approval is indicated by signature in the appropriate 'Final Approval' block on the Change Request form. The approved Class 4 Change Request package is forwarded to OPM.
- 16 - Cost Account Manager evaluates the Class 5 Change Request.
The Cost Account Manager evaluates Class 5 Change Requests.
- 17 - Cost Account Manager approves/disapproves the Class 5 Change Request.
For Class 5 Change Requests, the Cost Account Manager is the final approving authority. Approval is indicated by signature in the appropriate 'Final Approval' block on the Change Request form. The approved Class 5 Change Request package is forwarded to OPM.
- 18 - OPM determines the approval status of the Change Request.
OPM updates the Change Request Log after the review process has been completed. At this stage, the Change Request can be deferred, approved, disapproved or determined to be a duplicate of a previously submitted Change Request. Any disapproved CR is sent back to the affected CAM who will consult with the originator to determine any further action.

2.3 Documentation Phase (See Diagram 3.3)

After the Change Request has been reviewed and approved by the appropriate authority, it enters the Documentation Phase where the proposed change is fully documented and implemented.

- 19 - The Office of Project Management issues the Change Order.
OPM issues a Change Order for the approved Change Request. The Change Order is a completed, approved Change Request.
- 20 - Associate Project Manager updates the technical documentation.
Upon receipt of a Change Order, the affected Associate Project Manager ensures the appropriate technical documentation (drawings, specifications, etc.) is revised.
- 21 - The Office of Project Management updates the Cost Sheet.
OPM updates the Cost Sheet in the project's Cost Book.
- 22 - Cost Account Manager revises the Cost Account Plan.
The Cost Account Manager revises the Cost Account Plan based on the approved Change Order.

- 23 - Associate Project Manager reviews the revised Cost Account Plan.
The affected Associate Project Manager reviews the revised Cost Account Plan for compliance with the approved change to scope, cost and schedule plans, and approves or disapproves. Approved Cost Account Plans are forwarded to Project Services.
- 24 - The Office of Project Management updates the Working Detail Schedule.
Using the approved Cost Account Plan, OPM updates the Working Detail Schedule. [Note: Changes to the Performance Measurement Baseline may be consolidated and reserved for an annual (or as determined by the Project Director/Manager) project rebaselining.]
- 25 - Cost Account Manager implements the approved Cost Account Plan.
The Cost Account Manager performs the effort in accordance with the approved Cost Account Plan.

3.0 Process Flow Diagrams

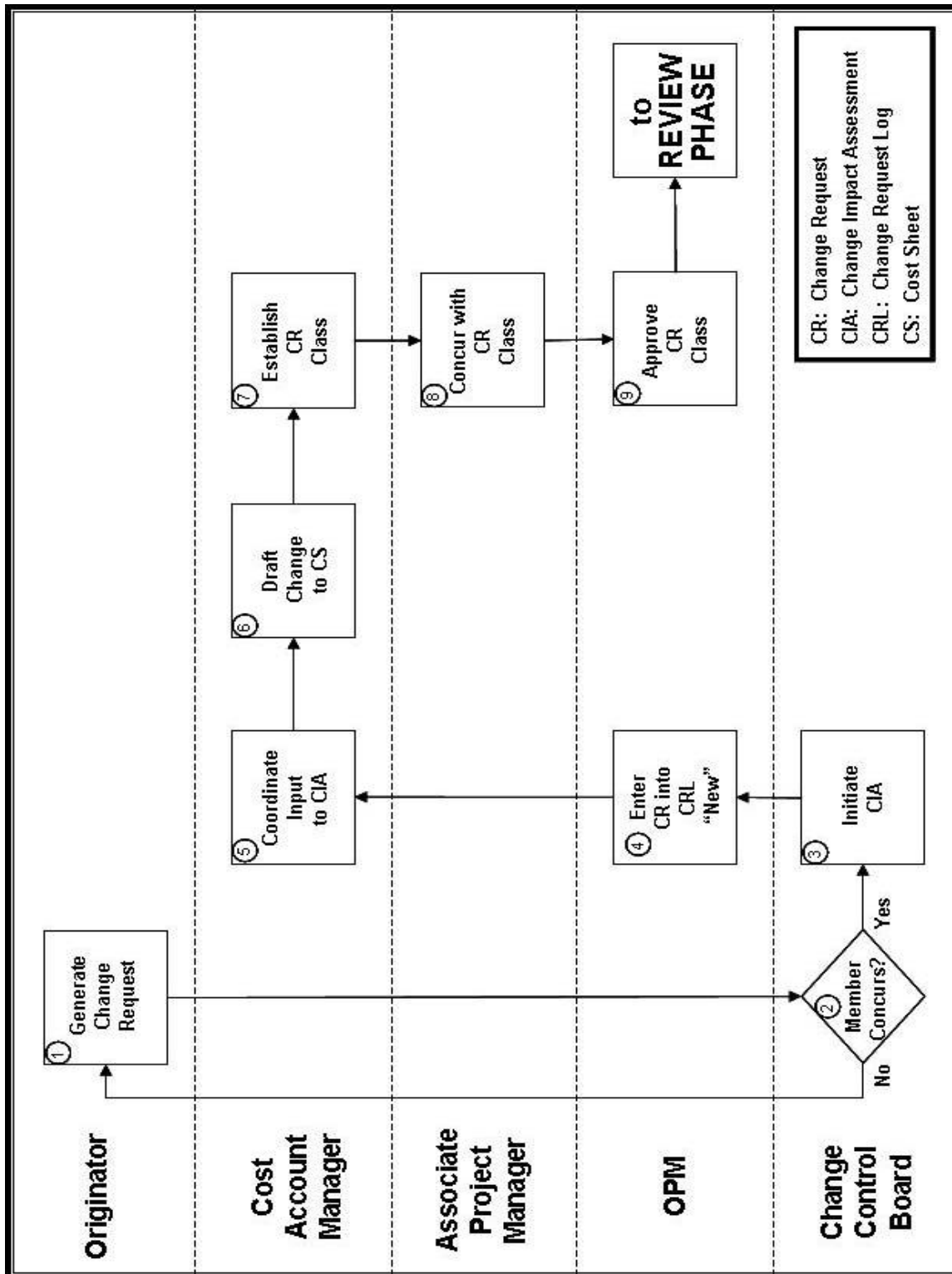
3.1 Request Phase Flow Diagram

3.2 Review Phase Flow Diagrams

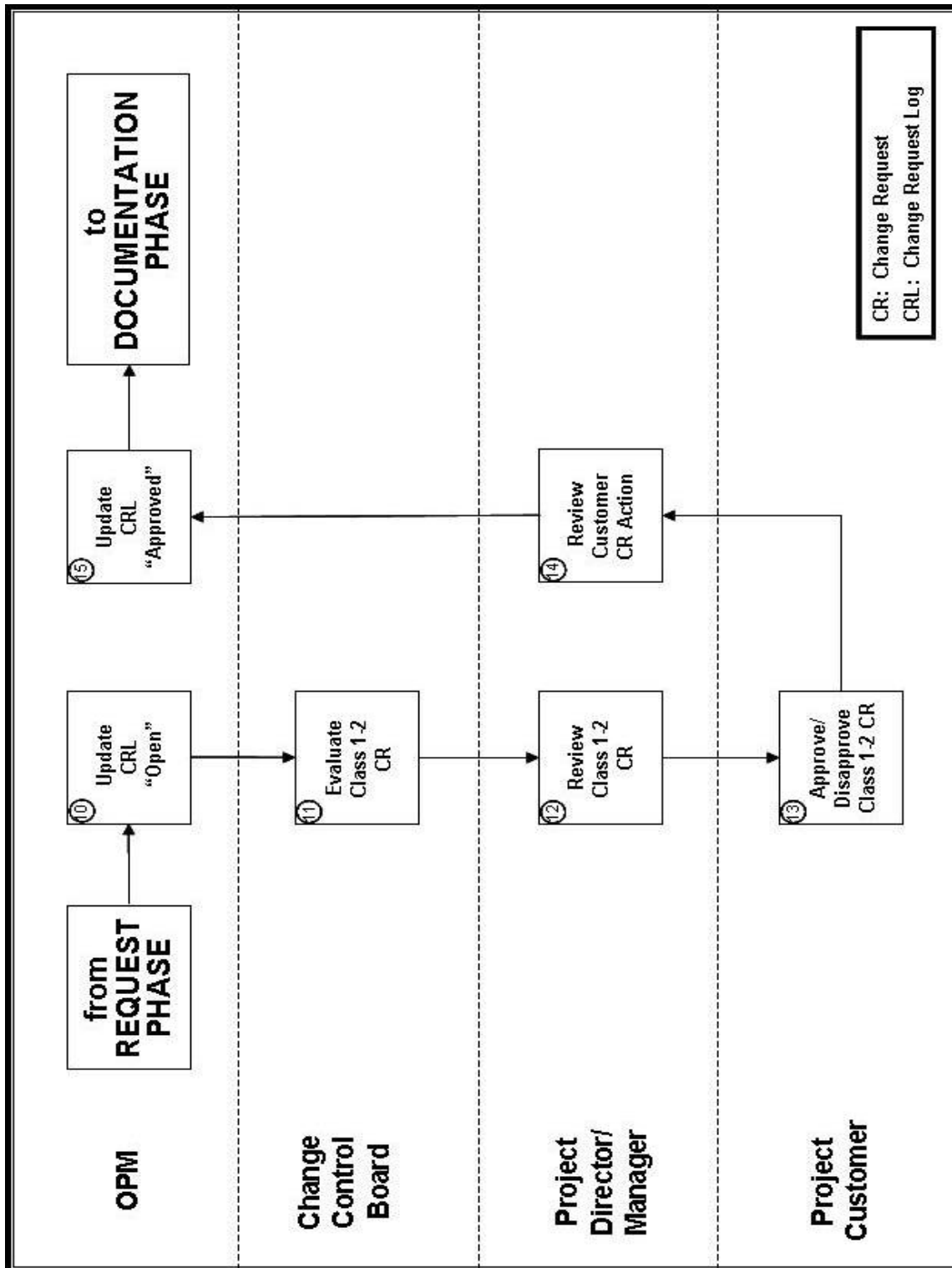
- **External Approval**
- **Internal Approval**

3.3 Documentation Phase Flow Diagram

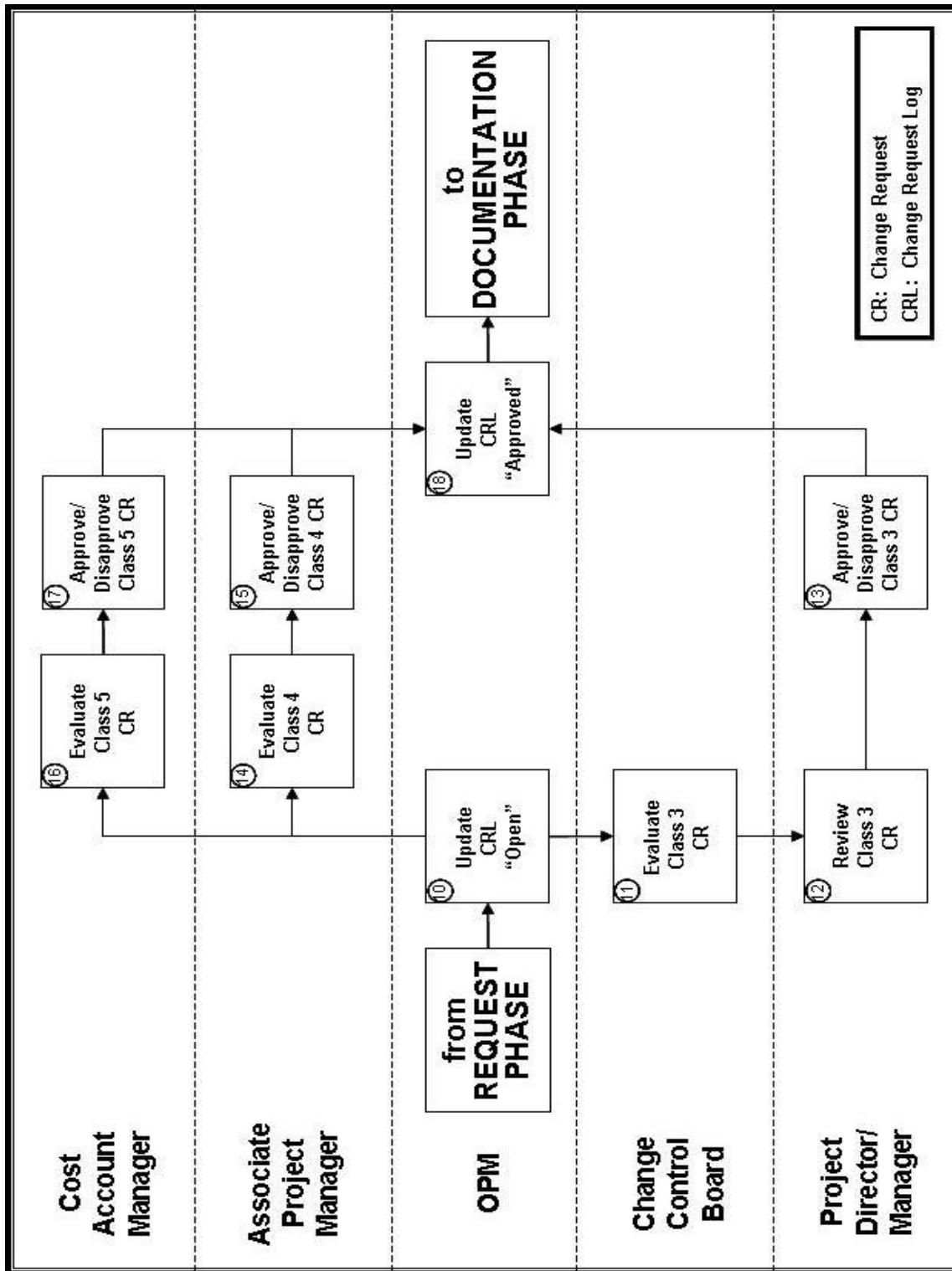
3.1 Request Phase Flow Diagram



3.2 Review Phase Flow Diagram (External Approval)



3.2 Review Phase Flow Diagram (Internal Approval)



3.3 Documentation Phase Flow Diagram

